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ABSTRACT

Fifteen experts in the fields of medical education and biomedical communications identified 95 events and conditions that might occur during the next 20 years in the area of biocommunications, health care delivery, and medical education; this document contains the verbatim comments provided as responses to these conditions by the study participants. This information supplements the report, "A Forecast of Events and Conditions that Might Affect Job and Training Requirements of Medical Librarians." The comments are categorized with respect to the type of person and/or job to which the comment referred--medical library personnel, communications specialists, library technicians, systems analysts, and information specialists. These participants provided comments about the types of librarians and biocommunications personnel who might be affected by the event's occurrence and the possible effects and training implications of each event. Automation, interagency cooperation, increasingly sophisticated information transfer, continuing education for professionals, and the establishment of information centers are the major areas of change as viewed by the experts. (Author/MBR)

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Listing of Comments Pertaining to Future Job Duties and Training Requirements For Medical Librarians and Biocommunications Personnel

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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Supplement to:

HumRRO Technical Report 73-30

A Forecast of Events and Conditions That Might Affect Job and Training Requirements for Medical Librarians

by

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Project ABILITE

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This document contains information supplementary to that contained in the report, *A Forecast of Events and Conditions that Might Affect Job and Training Requirements of Medical Librarians.* The report describes the findings of a study, the purpose of which was twofold:

(1) To identify those future developments, events and conditions in biocommunications and the delivery of health care which, if they should occur, probably would have an impact on the job and training requirements of future medical librarians.

(2) To obtain information on the training implications of the occurrence of these future events.

Fifteen experts in the fields of medical education and biomedical communications identified 95 events and conditions that might occur during the next twenty years in the areas of biocommunications, health care delivery, and medical education. The study participants provided comments about the types of librarians and biocommunications personnel who might be affected by event occurrence and the possible effects and training implications of each event.

This document contains the 95 event/condition descriptions developed during the above study. Listed under each description are the verbatim comments provided by the study participants. Although some of these comments have been edited slightly, many are exactly as provided by their author; the terseness of many comments is in keeping with the instructions provided to the study participants.

The comments have been categorized with respect to the type of person and/or job position to which the comment referred-medical librarians, communications specialists, library technicians, and so on.

It is our belief that these comments can be of particular value to those responsible for the training of future medical librarians.

#1 Use of computerized information banks such that health personnel (physicians, researchers, medical students, etc.) can retrieve specific answers to specific medical questions.

Medical Librarian

- o understand how to access system.
- o be able to explain in simple fashion for general users how to access information and use the system.
- o compile inventory of availability, mode of access to information banks.
- o serve as an intermediary in specific requests for access.
- o devote more time to achieving greater knowledge of biomedicine.
- o learn formatting for questions.
- o advise on question formulation and response interpretation.
- o use of on-line retrieval systems as intermediaries for physicians, researchers and other users.
- o responsible for instruction on the operation of the information bank; must be knowledgeable regarding its effective use and minor maintenance.
- o decrease in searches and use of written material containing information to answer the "specific question."
- o must learn to interact with a different information resource.
- o ability to negotiate and counsel on questions and evaluate answers.
- o knowledge of system capabilities and peculiarities.
- o in some cases, ability to analyze and develop systems.
- o expertise in operating CRT terminals.
- o expertise in writing "ad hoc" retrieval programs.
- o ability to develop "interest profiles" for heavy users of library.
- o ability to instruct users in how they should use the computer to obtain information.
- o increased knowledge of subject matter so that user can be guided into areas which have greatest payoff.
- o assuming that the information bank is administratively a part of the library and staff has the responsibility for data input, many new types of positions will be required, such as:
  --staff knowledgeable in computer systems application and operation
  --computer programmers
  --content specialists
- o if the library will house only a computer terminal, staff must be trained in computer systems search methods.
- o responsible for seeing that computer terminals are maintained in operating condition.
- o preparation of simplified instructions to enable health personnel to formulate requests.
- o consultations with patrons will be on "how to use the system" rather than "where can I find something."
- o there will be considerable responsibility to stay current regarding operating characteristics and search strategies of the bank.

(cont.)

#1 (cont.)

Medical Records Librarian

- o convert to problem oriented medical records; input to computers; on-line retrieval of records.

Physicians/Medical Students/Researchers

- o more use of medical records for research analysis.
- o must learn to utilize the technology effectively.

Technicians (Library)

- o better knowledge of system capabilities.

Information Storage/Retrieval Experts

- o at the moment, since the system (MEDLARS-MEDLINE) is based on citation retrieval, it does not fulfill the criteria of an information bank. Rather than indexing in terms of MESH, it will become necessary to develop an organizational basis to bank health information. This requires a new kind of person, skilled in information retrieval with adequate educational psychology and computer programming support teams beneath him or her to provide the type of systems needed.

#2 Existence of a nation-wide document and information service (a la airlines reservations network).

Medical Librarian

- o must become increasingly familiar with medical terminology to understand accessing.
- o explain to unsophisticated users how to access the system.
- o spend more time on determining access and availability of materials.
- o supervise clerical staff (technicians) who will process requests.
- o learn computer terminal operation.
- o more cataloging will be done nationally with resultant combining of acquisitions and cataloging functions locally.
- o use of computers for local processing.
- o must learn how to utilize technology effectively.
- o may have to learn how to enter data.
- o library will have to understand some aspects of man-computer services.
- o demand for copying services will increase.
- o closer coordination between medicine (health services) and library functions.
- o increased knowledge of information system design.
- o increased skills in system analysis and programming.
- o changes have already taken place in the creation of current MEDLINE support staff.
- o knowledge of how system works.
- o library personnel will require training in computer system applications and search techniques.
- o must becore local expert regarding the formulation of requests.
- o will spend more time arranging for the loan or copying of documents not available in the local collection.
- o coordinate activities of librarian with those of medical records librarian to assist in the retrieval of specific cases.

Physicians/Health Care Providers

- o required to have knowledge of how to use the system.

Medical Informationists

- o at present time there is not in existence a cadre of people capable of taking present medical literature and information and extracting it to essentials. Until such people are trained and made available not much significant progress will be made on a broad scale towards solving the information problem.

#3 Use of universal medical nomenclature for organizing medical data and medically-related information regardless of format.

Medical Librarian

- o increased knowledge (vocabulary) of medical terminology.
- o learn more about terminology and classification of diseases, etc.
- o organize bibliographies in relation to disease syndromes, etc.
- o changes will be made in cataloging terminology to reflect universal nomenclature.
- o learn new nomenclature for use in whatever their work happens to be. No necessary affect on job, except to effect "translation" for out-of-date users.
- o must know universal nomenclature and equivalent non-universal terms.
- o assist in the "translation" of non-universal to universal terms.
- o will raise havoc with traditional library classification. Libraries will have to modify present schemes for the organization of knowledge.
- o better training in nomenclature and standardization efforts.
- o will require re-training of indexing staff; train on new system.
- o would become much more involved in patient care data storage and retrieval.
- o new demands for the use of medical data in research students would have to be met.
- o would become provider of feedback to regional library on adequacy of universal nomenclature and its applicability to specific areas.

Medical Records Librarian

- o would join the medical librarian in one large "medical information center."

Physicians/Health Care Providers

- o would require knowledge of how system works and how to access it.
- o requires knowledge of how to put data into system for later use.
- o must know universal nomenclature and equivalent non-universal terms.

Medical Informationist

- o as new medical terms come into being, would have to incorporate them into the system.

Information Scientist

- o would require training in nomenclature, classification and similar efforts.

#4 Use of contractual agreements between medical library and its user institutions. These contracts would specify the type, amounts, etc. of services to be provided by the library and the charges for each.

Medical Librarian

- possibly acquire a "business person" for the library.
- specialized librarians will emerge and grow in number for performing the specialized duties of specific libraries.
- help health care facilities/schools determine their library service needs.
- negotiate with those facilities and prepare contracts.
- cost-benefit and cost-effectiveness analysis and capabilities.
- knowledge of machine systems and attendant costs.
- systems analysis.
- will have greater accountability for delivering services.
- will have additional responsibilities relative to the solicitation of those contractual agreements.

Managers/Directors

- will require greater knowledge of costing procedures to arrive at a realistic scale of charges. More insight into cost-benefit relationships will be needed.
- must be more responsive to needs of users.
- more attention to cost-effectiveness planning.
- this position is essentially one of accountant; the need for library expertise is only in order to enable the accountant to relate specific requirements and requests to specific cost items.
- current administrators should be able to handle, but, may require some legal back-up support.
- will require the development of better business practices in library operation. Responsible for legal implications of information and services furnished under contract.
- increased administrative responsibilities.
- evaluator of cost-effects and cost-benefits.

#5 Adoption of the general policy that, whenever feasible, the user will be directly charged for services provided by the library.

Medical Librarian

- o no significant change if this occurs.
- o formulate means of arriving at accurate estimate of costs.
- o may have to partially adopt a "salesperson" posture in relation to users, to help assure them that the service is worth the cost. This is not a trivial psychological transformation for a fair number of medical librarians, who tend towards a positive withholding of their services.
- o more transaction recording.
- o must be more responsible to real user needs.
- o explain to user the possible services and their charges.
- o accounting skills will be required.
- o cost-benefit and cost-effectiveness studies.
- o cost and impact of present and potential use patterns.
- o will have to become more conscious of cost-effectiveness of own efforts.
- o if charge is made, librarians should be more accountable for service provided.
- o all requests must be assessed to determine if a charge will be made and in what amount.
- o schedule of fees prepared.
- o bookkeeping systems developed.

Systems Analyst/Programmers

- o incorporation of automatic accounting procedures information systems.

Manager/Directors

- o formulate means of arriving at accurate estimate of costs.
- o initiate program of user education to make sharing of cost palatable.
- o keep accurate records of actual costs of each service and product.
- o would have to be responsible for establishing and operating a charge system. This in turn may lead to specialization of the "business operation" function of the library staff.
- o increased administrative responsibilities.
- o evaluator of cost-effects and of cost-benefits.

#6 Use of high-speed, low-cost facsimile transmission techniques to transmit printed material, illustrations, etc. from one location to another.

Medical Librarian

- o for some, instruction and knowledge regarding how to use equipment will be necessary.
- o technology may introduce changes in format for illustrations, i.e., printing.
- o supervise technicians in illustrations department.
- o keep track of costs and billing procedures.
- o part of larger change involved in the general move towards growing inter-dependency between libraries. Represents a change in attitude more than the acquisition of new skills.
- o not likely to be a major part of a library's operation.
- o know how to use transmission technology, and handle minor problems.
- o instruct library users regarding how to use technology.
- o maintain current lists of information sources present at other libraries.
- o know how to conduct cost-effectiveness analysis.
- o systems analysis skills: analysis of facsimile (or alternative) system capabilities and costs.
- o would have to spend more time deciding which documents should be stored locally vs. procurement via facsimile transmission on demand --such a system would greatly influence the allocation of the total library dollars available.

Technicians (Equipment)

- o larger library may need full-time equipment maintenance personnel.

Technicians (Library)

- o operate equipment.
- o will need to become more familiar with the operation of technical devices.
- o someone will have to know how to run all of the equipment required.

Communications Specialists

- o this position will require a thorough knowledge of the technology involved in data transmission via modern communication technology.

#7 Within a regional library network, selected libraries will be responsible for the selection, cataloging, indexing, providing storage and retrieval facilities, etc. of/for items related to a specific content area.

Medical Librarian

- o no change. Already being done in RMP's.
- o negotiate agreements with other libraries within the consortium as to responsibilities.
- o to provide mechanics for access to regional resources.
- o represents a change in attitude more than duties -- favorable attitudes regarding inter-dependence of libraries.
- o event will not occur. Rather, national networks will develop.
- o increased knowledge in specific content areas. Will require specialized training in that area and its terminology.
- o increased inter-library loan responsibilities.
- o greater awareness of cooperation and planning.
- o specialization of reference library's services and personnel.
- o changes in employment patterns.
- o little change in library function, though may mean change in attitude towards self-sufficiency.
- o will reduce the number of "generalist" librarians.
- o acquisition of greater medical knowledge of specialties, e.g., cardiology.

Managers/Directors

- o negotiate agreements with other libraries within the consortium as to responsibilities.
- o provide mechanics for access to regional resources.

Medical Informationists

- o increased need for persons trained in the extraction of information down to the "bare bones" essentials. (Referring to abstracting and summarizing information and data).

#8 Use of facsimile transmission technicuqes to transmit TV tapes and microforms from central storage facilities to libraries and/or to user facilities.

Medical Librarians

- o for some, instruction and knowledge of how to use equipment will be necessary.
- o technology may introduce changes in format for illustrations, i.e., printing.
- o serve as an intermediary and facilitate access.
- o part of a substantial change in orientation for some librarians who will have to begin relating to non-print materials as appropriate areas of concern. The skills involved will not be new, but new information will have to be acquired.
- o librarians will be unaffected because new services will bypass them.
- o learn to use technology and handle minor technical problems.
- o instruct users regarding how to operate technology.
- o maintain current lists of information available from other locations.
- o better knowledge of cable systems, TV resolution and reproduction problems.
- o AV technical training for librarians or addition of AV specialist to staff.
- o none anticipated.

Technician (Library)

- o someone will have to know how to run all the equipment.

Communications Specialist

- o this position will require thorough knowledge of the technology involved in data transmission via modern communications technology.
- o liaison between central storage facility and remote users who are personally in contact by way of a telephone network.
- o will become members of health library staffs.

Instructional Specialist

- o will become instructional materials procurement consultants to faculty and students.

Managers/Directors

- o the library director will have to be increasingly more attuned to communications technology, and employ an appropriate staff.

#9 Presence of a wide variety of easily accessible self-study programs (programmed instruction, computer-assisted instruction, etc.) for both the pre-service and in-service training of health personnel.

Medical Librarians

- o familiarity with system, how to access, correct errors, explain to unsophisticated users.
- o maintain inventory.
- o publicize availability.
- o evaluate access.
- o there is a substantial change involved in working with instructional units as contrasted with reference materials, which has been the exclusive concern of medical librarians in the past.

  Most librarians know little or nothing about quality instructional material design and utilization. If they are to be involved in the cataloging, distribution and recommendation of instructional materials, in whatever form, they will need a new set of skills and a new area of information and understanding.

  It is emphasized that experience in working with textbooks is no preparation in this direction. Texts are not instructional units.
- o more responsibility for advising, consulting, evaluating. Less responsibility for transfer of information.
- o catalog material; explain use of material.
- o greater involvement in educational processes, decisions, curriculum.
- o employment of "educational technologists."
- o capability of participating in message design at some level.
- o present training programs for biomedical librarians should be adequate for their work in the field of acquisition and distribution of these materials.
- o evaluator of usage of each program.
- o familiarity with "general" algorithms of self-study.
- o expertise in generating self-instruction packages in medical information science.

Communications Specialist

- o maintain and develop ideal operating systems to support high-level languages in time-sharing which are suited to computer assisted education tasks.
- o will be responsible for seeing that a variety of electronic equipment is in working order.
- o will have to keep abreast of the new developments in electronic self-study equipment and the instructional programs for these devices in order to work with faculty in making intelligent purchase/lease decisions.

#9 (cont.)

Instructional Specialists

- o a new position requiring knowledge of programming in such media as COURSEWRITER or other suitable high-level languages and educational strategies and working with subject matter experts.
- o administration of testing material to guide user in selection of appropriate material.
- o assessment procedures must be established for instructional materials acquisition.
- o will become consultant to faculty and students regarding the availability and suitability of self-instructional programs.

Systems Analyst/Programmers

- o possibly will also have to know how to develop and/or modify programs. Examples of these are available now. Demand will increase; duties will be refined to include how to prepare programs and how to modify.

Media Specialists

- o knowledge of information delivery systems.
- o knowledge of information organizations.

Academic Faculty

- o need to work in close relationship with technical staff who will be coding their content for others to use by way of an automated learning system.

#10 Presence of a nation-wide performance-based certification system for all types of health service personnel.

Medical Librarians

- o do not believe this will happen. Will not affect librarians anyway.
- o the only conceivable involvement of librarians would be in the process of helping health professionals prepare for their certification exams.
- o increased use of library facilities.
- o library will be an element in such a system. In short, it may have to certify that information is used when appropriate (e.g., in education, reference, research, etc.).
- o this event would force the librarian to provide specialized programs and materials for persons seeking certification.
- o librarians may be important providers of performance data, provided that event #3 takes place prior to this event.

Managers/Directors

- o modify library resources to more closely meet the educational requirements imposed by certification.

Academic Faculty

- o will affect teachers/curriculum--will teach to national standards instead of their own evaluation criteria.

#11 Presence of a number of recognized biomedical information specialties, each of which is related to a specific or small set of medical specialties.

Medical Librarian

- o will need to seek out subject specialists for employment. Will mean that librarians will need additional subject matter expertise.
- o will have to work in conjunction with subject specialist.
- o require specialty training with emphasis on vocabulary.
- o cataloging in greater detail.
- o impact on education and training of biomedical librarians/information specialists.
- o might be useful for indexing and information retrieval, but possibly too costly. Persons who do indexing at present are not content experts. Of course, this is a disadvantage, but it is economically feasible this way and would probably not be otherwise.
- o higher degree of training in health sciences.
- o acquisition of greater knowledge about medical specialties, especially vocabulary.

Medical Informationist

- o will require specialized knowledge of area of expertise.
- o will require information specialists and/or librarians who will have developed substantial content expertise in the medical specialty areas to which they relate. They will then serve more as consultants to, and colleagues of, the specialist than librarians now do.
- o existence of a large number of "specialists" within library who have some knowledge of their specialty.
- o would have to become extremely familiar with the anatomical and physiological terms related to the medical specialty, as well as the standard treatment plans and medical record data.

#12 Use of computer-assisted instruction to teach health service personnel how to use information networks to perform literature searches, use CAI (computer-assisted instruction) programs and related equipment, use dial access systems, and so on.

Medical Librarian

- o develop programs, evaluate effectiveness. Probably not a great demand.
- o necessary to understand the range of available services and products.
- o achieve great skill in interpreting questions and devising search strategies. Will require thorough knowledge of indexing languages such as MESH and modes of access to information data bases. Will need training in on-line system capabilities, e.g., dial access libraries.
- o librarians would be newly involved in designing, testing, and utilizing these instructional programs.
- o librarians would be relieved of much of the effort now expended in teaching some of these skills through conventional techniques.
- o will need to be able to help the increasing number of computer users with log-on procedures--to get them connected.
- o will have increasing demands for "intermediary" services; as direct use of computers increases so will use through intermediaries.
- o instruct users in operation of CAI and other technical equipment.
- o the library is normally thought of as a repository of information. The use of this information is in the province of the appropriate other professions. However, the degree to which the library may wish to assume some of the traditional roles of other professions is open, and a matter of its limitations.
- o ability to discuss search strategies and methods in precise terms.
- o familiarity with CAI constraints and potentials.
- o should not be much of a problem to the librarian or others. So far, students have adapted to this technology rapidly and without much difficulty.
- o we are doing this now without having to create new responsibilities.
- o would become responsible for authoring (or adapting) programs for local use.
- o would spend less time directly formatting searches (etc.) and more time serving as a consultant to users who are performing these functions themselves.
- o evaluate usage of each program.
- o become familiar with general algorithms of self-study.
- o acquire expertise in generating self-instructional packages in medical informance science.

#13 Existence of inexpensive, high-quality microform readers for home, office or library use.

Medical Librarians

- o some change in attitude and tasks involved; probably greater use of phone requests and mail distribution of materials.
- o will distribute non-returnable microfiche copies instead of basic document.
- o distribution of material (microform) for use outside the library.
- o provision of microform copies (duplicate microfiche).
- o establish systems for purchase, lending, and/or reproduction of microforms.

Technicians (Equipment)

- o no impact on librarians, rather on repairmen, distribution personnel, and production personnel.
- o will impact on "electronic technicians."

Medical Informationist

- o technology exists for this. Real problem is obtaining persons who can extract information, summarize it, and prepare it for the microformat.
- o this event will speed the transition of medical libraries from book storage places to dynamic medical information centers.
- o no impact; all librarians have mastered xeroxing.

#14 Existence of inexpensive and rapid procedures for converting microform material to hard copy.

Medical Librarian

- o substantial change of attitude and tasks as there develops a decreased dependence upon storage and retrieval of hard-copy materials.
- o librarians can invest less effort and emotion in protecting their collections and more in promoting user access and services.
- o instruction in use of equipment.
- o knowledge of marketplace for reader/printers.
- o this event will force the librarians (along with event #6) to become more conscious of the economics of storage. More time will be spent making storage mode decisions.
- o none, since this takes place already.

Technicians (Equipment)

- o will affect the duties of "microform technicians", not librarians. Stumbling block to implementation is the lack of persons who can extract information and prepare it for microform.
- o affect electronic technicians, not librarians.

Lawyers

- o more business and copyright problems for lawyers to solve.

#15 Existence of a variety of biomedical information centers for the purpose of collecting, analyzing, repackaging and disseminating a wide variety of data related to specific medical subject areas.

Medical Librarians

- this implies the making of judgements which medical librarians are not now able to make. They would have to be trained more thoroughly in the techniques of data collection, analysis, repackaging, and distribution of information. These duties could lead to the development of a "Biomedical Information Specialist."
- will need to inventory all available sources and provide access.
- need to operate a "one-stop" referral service to connect clients with appropriate service.
- training in specialty area.
- more specialized knowledge of medical specializations.
- knowledge of data and data banks, and their role in biomedical research and practice.
- acquisition of greater medical knowledge of specialties.

Medical Informationists

- will need to exercise evaluation as to the significance and importance of material in relation to specified audiences and defined needs.
- this implied set of skills is substantially different from those now possessed by librarians. So much so, it is highly unlikely that they will be the ones to be involved in performing these tasks. It is much more likely that these will be performed by content personnel who come (as they now do) from a non-library background.
- again, a problem related to the availability of people to extract data in specific subject areas for which they have expertise.

#16 Existence of the "open school" concept at most universities and medical schools with the result that many students will be studying off campus and contacting the library for the home use of instructional equipment, instructional programs, etc.

Medical Librarians

- o increased demand for loans.
- o it remains to be seen whether the libraries or a separate "institutional resources center" will be the locus of these activities. It now appears that the need for these services may come faster than many librarians have been capable of adapting to. They need to change their self-image, acquire new skills, and relinquish many old habit patterns--which may or may not be feasible for many of them.
- o increased responsibility for, and quantity of, multi-media material.
- o many more requests for services; increased requirement to respond to batch and on-line requests by various groups of users. Substantial technology will be required; also, a functional reorientation of services and staff.
- o many job descriptions have been written on media librarians, but the increased emphasis on the open school concept will provide the need for upgrading their technical skills in the handling and manipulating of equipment. In addition, these persons might well be called upon to instruct students in the proper use of equipment.
- o the location of these information sources will probably be medical library, in the form of self-instructional programs (CAI, AV, TV).
- o keep inventory of materials on loan to community hospitals, preceptors and students.
- o act as consultants to local preceptors in matters of information retrieval.
- o will store and retrieve instructional programs in a variety of media forms.
- o must develop indexing and search procedures for instructional programs in a variety of media forms.

Instructional Specialists

- o will become part of the medical library staff and assume responsibility for instructional equipment and programs.
- o will become valued consultants to the faculty on matters of instructional development.

Academic Faculty

- o major curriculum/instructional process reorganization will be required of library school faculty.

#17 Active involvement of medical libraries in community health programs.

Medical Librarians

- Learn more medical terminology; be able to instruct new set of users.
- may have to learn how to relate to patients.
- more attention to materials for health care consumers relative to materials for health care providers.
- cooperation with community health program personnel.
- increase holdings of relevant material.
- better knowledge of public health problems.
- knowledge of community information patterns.
- knowledge of diffusion of innovations.
- need librarians who can meet with public and identify educational needs.
- will provide instructional materials for the general public on health matters. These programs may well be prescribed by health professionals similar to the way drugs are now prescribed.
- providing these programs will require the development of simplified instructions and procedures which can easily be followed by an unfamiliar public audience.
- knowledgeable in health care systems and understanding of role of public.
- capability to evaluate usage of material.

Managers/Directors

- More active participation in community health activities, to include discovery of information needs and usage patterns.

#18 Common use of librarians to help university/medical school instructors plan courses and to select instructional material.

Medical Librarian

- o must understand basis of curriculum evaluation and instructional objectives.
- o modify present training to accomplish this.
- o work more closely with instructors and clinical faculty.
- o unlikely.
- o will require familiarity with medical curricula and requirements for instructional material
- o probably will never take on this role.
- o message design.
- o curriculum design.
- o medical knowledge.
- o development of librarians who have a fairly extensive background in curriculum and instruction design.
- o become an expert in education methods.
- o evaluate teaching effectiveness.
- o become knowledgeable of medical school (and other schools) selection and promotion methods.

Instructional Specialist

- o unlikely event. If happens, job will be filled by persons trained as instructional technologists.
- o these functions will more likely be assumed by the biomedical communications specialists who will function as a member of the library staff.

Managers/Directors

- o more active participation in curriculum committee and evaluation program.
- o academic appointment for library administrators; better communication between them and members of the faculty because of a better basis for cooperative efforts. In the past, when library administrators were strictly library oriented, there was no point in such communication efforts.
- o the chief medical librarian will have to broaden his knowledge in the area of instructional materials and equipment in order to properly manage this function.

#19 Use of input/output terminals in a physician's office or in or near his area of practice so as to link him with an information network which provides access to a wide variety of medical data and information, and which provides access to a variety of continuing education programs.

Medical Librarian

- o acquire knowledge of system sufficient to teach MD how to use.
- o possibly required to package, modify programs.
- o instruct physicians on how to use terminals.
- o there will be a need for a shift in mode of operation; from face to face and fairly personal interactions to impersonal and remote. May to some extent, require a different kind of person.
- o working cooperation with network.
- o orientation of librarians toward technology and communications.
- o librarians will need to cooperate with other occupations (other than medicine) that have similar systems (on campus).
- o ability to advise physician on best program for his purpose.
- o such terminals are most likely to be located in medical libraries.
- o librarians will have to write CAI courses and/or printed programs of instruction to teach health professionals how to utilize these terminals and networks.

Technicians (Equipment)

- o terminal maintenance personnel.
- o trouble shooter for the system's failures in a doctor's office.

Communications Specialist

- o assuming that a cadre of people is available to extract information to a suitable format, the transmission problem is primarily a technical one and an engineer-oriented person with medical information as a background should be available.

National Coordination Agency

- o need for a national coordination body or agency to keep track of the "wide variety" of data, information and countinuing education programs.

#20 Medical practitioners will have the responsibility of ensuring that their patients are directed to informaiton sources which will inform the patient about their illness(es) and what the patient should do to contribute to the care and management of his medical problem(s).

Medical Librarians

- o if this happens, librarians may be required to train office personnel in methods of information retrieval, location of information sources, and so on.
- o will have to learn how to work with instructional units; how to select them, evaluate them, and so on.
- o increase library holdings to contain material suitable for patient use.
- o channel patients to relevant information sources.
- o greater coordination of library activities with the biomedical decision process of physicians.
- o little change because information source "prescription" should remain in the physician's hands.
- o capability to advise physician regarding quality and scope of new material.
- o the location of these information sources probably will be medical libraries, in the form of self-instructional material.
- o knowledgeable in health care systems and understanding of the role of the public.
- o ability to evaluate usage of material.

Medical Informationists

- o to extract modern medical literature and information into a format useful for the general public in their own self care will be the most exacting and demanding task of all. This task will require persons trained in public education and persons familiar with the learning capabilities of the adult public.

Medical Receptionists

- o need to understand terminal network, computer access and other tasks which are not very difficult but which are not currently a part of such a person's job description.

#21 Use of communication satellites for the two-way transmission of health care information to remote locations, especially to include the transmission of diagnostic and patient management information.

Medical Librarian

- o don't believe changes will be in libraries; will be in medical record office, physicians diagnostic rooms. Literature searchers will require no intermediaries.
- o librarians will need to provide an "on-line" interface between users of the information source. They will have to operate in a new time scale; i.e., virtually instantaneous responsiveness.
- o understand use of technology and its users.
- o familiarity with medical record practices, specialty problem oriented approach. Decoding of diagnostic and/or problem codes. Consciousness of confidentiality and privacy of data; supervision of maintenance of equipment.

Medical Records Librarian

- o conversion to problem oriented medical recores; implies new record handling procedures on system organization and input. Will require computerized records, computer data input procedures, etc., leading to reorganization of tasks, keypunching, etc.
- o will require much standardization of medical record keeping and improvement (including some form of error check) of records.
- o need for greater expertise in computer, communication technology. Need for managerial skills to coordinate efforts of larger number of technical personnel.
- o more volume; increased workload. More stringent validity checking requirements.
- o I am not sure how their job duties will change, but I would anticipate a much broader range of technical communications categories.

Physicians/Health Care Providers

- o understand use of technology, increased facilities made available to the practitioners, requires increased "knowledge" on his part.
- o clinical decisions will be based on statistical definitions of decision outcome; peer review will evaluate quality of decisions.
- o input messages will be more voluminous and complicated, will need "digest" capability.

Technicians (Communication)

- o responsible for operation of equipment associated with the transmission systems.
- o this event is now happening in our instruction. To date it has not affected very much the librarian. We have operated this function out of our "Office for Continuing Education" which administratively is not related to the library. In case the event is administratively operated out of the library, it will involve many people; Engineers, A/V technicians, etc. The administrative responsibilities of the librarian would include problems such as negotiations

#21 (Continued)

with NASA (or whoever is in charge of the satellite) and fiscal people of one sort of another who fund this very expensive operation.

- o not a feature of most medical libraries at the moment. Responsibility to maintain transmission link and to re-establish if equipment requires repair.

Medical Informationist

- o familiarity with medical record practices, specially problem oriented approach. Decoding of diagnostic and/or problem codes. Consciousness of confidentiality and privacy of data; supervision of maintenance of equipment.

Miscellaneous

- o more emphasis on ability to evaluate evidence of worth of diagnostic and treatment procedures. Ability to screen single items (messages from flow); provide "alert" service to others.
- o clinical department (i.e., care oriented clinical information) will be required, sponsored by NLM, but kept in a clinical environment.

#22 Use of TV networks, based on either or both satellite and microwave transmission techniques, for the two-way communication of medical lectures, panel discussions, diagnostic consultations, disease management information, and so on.

Medical Librarian

- o none anticipated unless libraries become total learning resource centers, i.e., with a variety of auxiliary learning aides.
- o librarian would advertise and publicize the availability of such facilities.
- o understand technology and its potential application. Catalog and retrieve video tape material.
- o will have little effect unless librarian changes attitude from control of information to transfer of information, and becomes competent in broader range of media and channels including message design.
- o I think this event will bypass biomedical librarians.
- o cataloging of libraries of video, film, and audio tapes. Dissemination of lists of available material to health care providers and health care institutions. Notification to health care providers and health care institutions of future "teleconferences," telelectures, etc.

Physicians/Health Care Provider

- o I believe my philosophy mentioned under #1 applies to this as well (librarians won't be affected). In addition, of course, this involves physicians, and other health professionals who would be willing to devote significant portions of their time to the venture.

Technicians (Equipment)

- o expanded responsibilities for two-way video transmission systems.
- o responsible for operation of equipment, and perhaps maintenance.

Communication Specialists

- o not a library-related activity. Will be a biomedical communication center activity requiring technicians, "producers," "instructional developers," and "evaluators."

Instructional Specialists

- o more emphasis on scheduling skills, quality control and production capabilities.

Management

- o instead of "library" functions under semi-autonomous library management, will have a new medical communication system. Facilities management will be needed to integrate library, computer and audiovisual services.

Medical Informationists

- o Again, this is <u>not</u> developing under the library in our institution, but rather out of the continuing education office.

#23 Development of communication links between the hospital, doctor's office or medical research establishment so that selected laboratory tests can be quickly performed by automated laboratory equipment located remotely.

Medical Librarians

- o none.
- o provide bibliographic backup in relation to specific topics, diseases, syndromes, etc.
- o no direct impact on libraries. Little, if any impact on Medical Librarians.
- o little effect on library, except as possible facilitator, though this depends on change in attitudes.
- o will not involve biomedical librarians.
- o familiarity with resources available in the community for this purpose.

Medical Records Librarian

- o new procedures for automated entry of results into medical records.

Physicians/Allied Health Professionals

- o the selected laboratory tests must be performed on the patient or fluids removed from the patient. In the case of the patient, himself, EKG's or EEG's, heart sounds, blood pressures, etc. can all be performed at remote locations, e.g., astronauts monitored in space. Laboratory tests on fluids are another problem. In any event, I don't see strong input from the library in this area. If, of course, biotechmetry administratively happens to develop out of the library this is another matter.

Technicians (Library)

- o flow control on requests for service (scheduling). Skill required in remote handling equipment. Record keeping.

Communication Specialist

- o full training in pathology. Full (2 years) training in medical information processing.

Managers/Directors/Supervisors

- o development of cross-checking procedures for quality control. Procedures for handling complex routing of jobs -- scheduling.

#24 Use of computer-based network(s) for the storage/retrieval/transmittal of medical records of patients to or from wherever the patient currently is being seen.

Medical Librarian
- o none.
- o no direct impact on librarians.

Medical Records Librarian
- o implication is for medical records "librarians" (or administrators, as they prefer to be called). They will be able to become engaged with statistical summaries, audit, and clinical research, and will be freed of being policemen.
- o will require much standardization of medical record keeping and improvement of records.
- o Medical Records, I still think will be stored in departments in the hospital setting, not in the library. I would predict medical records in the physician's office would more likely join this "pool" of records than utilize a library. I'm afraid I don't see this as a function of a medical librarian. Nurse or physician's assistant in the physician's office will have to be familiar with computer retrieval.
- o increased volume of work, scheduling. Validity checking procedures.

Programmers/Systems Analysts
- o improved coding schemes.
- o development of privacy control devices. Quality control procedures. Development of procedures for delivery of valid data to site of clinical transaction.

Information Storage/Retrieval Experts
- o this may be MS in health information processing as developed at SUNY at Buffalo.
- o persons will have to be trained in the science of extracting information and putting it into a suitable format for abbreviated communications.
- o persons trained to access remote computers by way of networks would be of value to the medical record staff and presumably the medical library would have such.
- o training other persons.

Regional Ethical Health Data Centers
- o Regionalization of the practice of medicine. Team of experts to operate ethical regional health data centers.

#25 Use of computer based programs for evaluation of the quality and cost of medical health care. Procedures based on the use of "problem oriented records" and patient care appraisal (PCA) procedures.

Medical Librarians

- o not relevant to medical libraries.
- o no direct impact on libraries.
- o will not affect librarians.
- o familiarity with methodology of evaluation, specially outcome measures. Interaction with peer review committees in terms of facilitating compilation of data bases. Familiarity with medical record keeping procedures.
- o not a medical library problem.

Medical Records Librarian

- o development of capability to handle increased volume of materials without mix-ups.

Systems Analyst/Programmers

- o development of new algorithms for assessment, i.e., templates for standards in the patient care scenario for different medical conditions.
- o to design new criteria for quality of care, formulate algorithms to prove the validity of the assumptions upon which the criteria were based.

Medical Informationist

- o ability to reconstruct cases from disparate records. Ability to integrate "case" data with relevant materials from technical literature.

Information Scientist

- o re-design of record formats, so that they are modular.

Cost-Benefit Analysts

- o none - changes will occur in medical records, medical comptroller or special office designed for this.
- o more careful look at cost-effectiveness of library component of costs and concern for justification of budgets, library and otherwise.
- o this is a natural for the computer--but this can best be centralized in a hospital setting because this is where the data is. Additional "cost data" from the physician as a result of office visits, etc. would be fed to this facility. Again, I see this as a remote responsibility of the medical librarian, unless they are to man the fiscal offices of hospitals.

#26 Widespread existence of logic-based computerized question-answer systems (e.g., artificial intelligence) for use as an aid when formulating a diagnosis, or for use in educational settings.

Medical Librarians

- o again, as libraries are currently structured no changes, unless they become "complete" learning resource centers. The computers or their terminals will be in such centers.
- o will be on-line, direct access systems, designed for unassisted use by health professionals, not requiring librarians.
- o assistance to students in medical library settings to help them select the most useful computer services for their needs and to teach them the "log in" procedures to start using such interactive services.
- o responsible for instructing users in the use of the system. Understand operation of the equipment.
- o use and design of these systems so that users can branch to relevant literature synopses when necessary.
- o expanded role in education by being resource to faculty re. availability of resources.
- o closer to the library than #25, but still more likely to be used where the information is needed -- on ward rounds, in the clinic, etc. Before long, terminals will be ubiquitous and one will not have to go to the library to use one anymore than we go to the telephone exchange to make a phone call.

Physicians/Medical Students

- o decreased use of reference material, increased use of the system.

Technicians (Equipment)

- o maintenance of equipment.

Instructional Specialists

- o more capability to relate specific context to most effective modes of presentation.

Systems Analyst/Programmers

- o of course the precedence is already established for this. The project sponsored by the NLM and the Lister Hill Center is already doing this. In our own institution, I have not detected significant changes in the duties of our medical librarian. He probably has had the most difficult time in educating the faculty to use the terminals which have been installed in our library.
- o more contact with the experts in medical diagnostics; will need more content knowledge in this area.

Medical Informationists

- o trained in medicine and in information processing, biostatistics.
- o people will be trained in science and art of extracting essential information from literature and putting it in abbreviated format.

#27 Development of data banks containing medical records which can be used for medical education and research. (Assume adequate measures for preventing unauthorized usage or disclosure of patient identity).

Medical Librarian

- o provide bibliographic backup.
- o librarians will learn to assist with accessing a variety of information sources which are computer, rather than shelf, stored--of which this is only one.
- o instructing users in use of system, its potential application.
- o since I believe these data bases will develop more in the hospital setting, I believe the educational use of these banks will also have its roots in this setting. Hence, if this were to be computerized, the data would be programmed so that it could be retrieved for educational purposes rather than patient management purposes. I do not see this becoming a function of the duties of the medical librarian.

Medical Records Librarian

- o standardization of reporting and report formats.
- o ability to work as a team member.

Instructional Specialists

- o ability to integrate content, see and highlight relationships between separate cases.

Systems Analysts/Programmers

- o ability to identify most instructive instances from the files.

Managers/Directors/Supervisors

- o management will need to learn enough about computer systems to manage operations knowledgeably.

Medical Informationist

- o medical background combined with competence in health information processing.

Information Scientist

- o trained in systems sciences, information processing, computer application, etc.

#28 Development of computer-based systems for monitoring drug utilization patterns.

Medical Librarians
- o instructing users about system and its operation.
- o no doubt this may become an integral part of medical libraries. This should not be confused with poison control centers which are more likely to be associated with hospital emergency rooms.
- o not a library function.

Physicians/Health Care Providers
- o will fall to medical record administrators, not biomedical librarians.

Technicians (Equipment)
- o maintenance of system.

Systems Analysts/Programmers
- o new algorithms based on validated models of drug interactions, drug sensitivity, characteristics of patient.

Medical Informationists
- o the pharmacist I think will play a more vital role. Within the library setting, he might become part of the library staff. I predict the pharmacist of the future will have an expanded role in the health professions, especially Pharm D. program. These people have more knowledge than just counting 100 pills out of a bottle containing 1,000.
- o more demand for accurate retrieval capability.
- o trained in clinical pharmacology, information processing and able to construct algorithms.
- o interaction, peer review and pharmacy committees. Participation in in-service programs on drug classification and usage.

Statisticians
- o provision of models.

#29 Development of "quality control" procedures for monitoring medical services; procedures based on the use of clinician's audio diaries, semi-automatically transcribed.

Medical Librarians

- o no changes
- o no direct impact on librarians.
- o I have grave doubts on this one. The "genetic" make-up of most physicians I do not think will allow this to happen.
- o familiarity with service evaluation methodology and with medical records record-keeping procedures.
- o do not believe this will occur.
- o not a library function.

Medical Records Librarian

- o again, health record administrators, not librarians.
- o improved capabilities for indexing audio records. Likewise, re-transformation of audio records to written formats.

Systems Analysts/Programmers

- o same as above plus privacy control "quick-check" algorithms for quick review.

#30 Widespread substitution of technical-level personnel for professional librarians in health science libraries to optimize manpower utilization.

Medical Librarians

- o more emphasis on management and supervisory skills with attempts to systematize and stabilize library operations to permit consistent and repetitive performance by technicians. Professional staff will need knowledge of operations, management, cost accounting, budgeting.
- o will need to learn to be effective supervisors, organizers, managers, and teachers.
- o responsible for coordination and effective use of library resources, rather than technical operation of equipment.
- o cataloging will be centralized.
- o no doubt this total questionnaire will establish a very broadened role for the medical librarian, so broad that he or she will not be competent in all technical areas. Hence, their role will become more administrative, to see that particular people with technical competence meet their responsibilities. Many of these people will have to be taught the use of sophisticated techniques, especially computers. The librarian's supervisory role will be expanded even more.
- o more detailed job descriptions for library training specialists.
- o more extensive and rigid job performance specifications.
- o close supervision of technical staff. In-service continuing education programs for technical staff.
- o possible, but it would be more desirable to have the professional librarian obtain technical skills, and especially to learn how to supervise technical work of a library nature.

Technicians (Library)

- o responsible for operation of, and instruction on the use of, new technologies.
- o training in conventional library tasks.
- o as automated information retrieval systems become more prevalent, the need for information technicians will become greater. The retrieval of information from information systems will require technically trained persons who understand the system, in addition to the effort of the professional librarians in the proper cataloging and classification of the material. The extreme complexity of some of the proposed retrieval systems might upset the concept that the professional librarian is a superior in the chain of command. In this context, the professional librarian might be considered a technician concerned with technical aspects of information classification.

#30 Continued

Managers/Directors/Supervisors

- o greater need for management skills; knowledge of organizations and group dynamics.
- o development and supervision of in-house training programs.

#31 Conversion of large portions of existing library holdings to microform to reduce space requirements.

Medical Librarians

- o once phychological conversion of librarian is achieved, away from bound paper copy, the basic tasks will be the same.
- o conversion of existing holdings to microform cataloging and indexing.
- o some change in methods of work.
- o assistance in the design of microform systems, including transmission over cable and other channels, and in the design of random access systems for microform retrieval.
- o improved capability for research, using a synthesized search strategy for pulling together materials from sets indexed in different ways.
- o development of ulitization policies, i.e., circulate materials in microform, production of full-text copy and delivery to user for fee.

Technicians (Media; Photomicroform)

- o more responsibility to expedite and manage.
- o no question this is happening now. In our institution, the centralization of such equipment may occur in our audio-visual department of of educational recovery so may not involve the librarian. He will send his journals to be microfilmed, just as he sends them to be bound. If it does occur within the library, then of course technicians experienced with micro-filming and processing will be necessary. Individuals concerned with cataloging will have to be familiar with techniques for filming and retrieval of the journal. If the borrower requires printed copy, then a technician to produce this must be in the library setting.
- o physical disposition of micro-form collection.
- o this is essentially an extension of duties already performed by the microfilm technicians in libraries and in commercial companies.
- o better ways to accomplish same function, i.e., data banks that reduce need to store massive collections by digesting new information rather than merely storing it.

#32 Establishment of MEDLINE terminals in all medical school and research establishment libraries.

Medical Librarians

- o will upgrade the level of performance. Will require knowledge of interaction systems and MEDLINE procedures.
- o acquisitions policy will be improved by the MEDLINE list,.
- o a larger number of librarians will need the search and terminal operation skills now possessed by a few.
- o Conducting searches as intermediary; teaching people how to conduct their own searches.
- o instruction in the use of MEDLINE. Perform portion of MEDLINE searches. Decrease in manual searches.
- o competence in understanding man/machine communication.
- o new methods of bibliography searching.
- o negotiation of inquiries as part of providing assistance to user. Systems knowledge in order to utilize systems fully.
- o May not be adopted by schools. If they do, the librarian's role might be important as a salesman. Faculties are impressed with the expense of these systems, and may not be willing to accept them.
- o knowledge of how search system works.
- o improved ability to promote effective use of MEDLINE capability and mediate in the computer transaction.
- o development of resources to respond to requests for more varigated materials.
- o developing means to insure capability for document delivery based on retrieval citations.
- o persons who execute MEDLINE searches (some prefer to have the user execute their own searches. It takes more time, but there are some advantages to this approach.)

#33 Development of on-line interactive dynamic medical encyclopedia or handbooks.

Medical Librarians
- o need to know how to access as adjunct of reference service.
- o learn to assist with accessing a variety of computer-based information sources.
- o conduct searches; teach users.
- o instruct in the use of the system. Decreased use of written reference materials.
- o knowledge of information organization and "trails of association" so can assist in design.
- o subspecialization of librarians according to medical disciplines.
- o mediation of use of facility.
- o very unlikely, since interaction for each type of user would have to be anticipated and programmed. This is too costly. Books are still cheap and convenient.

Technicians (Equipment)
- o maintenance of system.

Systems Analysts/Programmers
- o mediation of use of facility.

Information Storage and Retrieval Experts
- o possibly need a new type of personnel. Would have to instruct would-be users; apply new information to encyclopedia handbook; advise on problems and categorization of information.

Medical Informationists
- o need contact experts cross-trained in certain aspects of information processing.
- o although many programmers will be needed for this, the greatest need will be for people to write these interactive dynamic encyclopedias or handbooks. Until the rewards for this undertaking (fiscal or promotional) are better than they are now, these will be difficult to get off the ground. When they do, I am not sure what the librarian will contribute. Faculties in their areas of specialty must write these.

Information Scientists
- o knowledge of man-system interface so that interaction can be optimized.

#34 Reorganizaiton of library resources into two kinds of information information for researchers and information for practitioners.

Medical Librarians

- o reference librarians will sub-specialize.
- o reorganization, recataloging, "cross-referencing" material. Assist library users in determining the kind of information they require.
- o develop two sub-specialties of reference librarians.
- o better understanding of question formation and information needs. Better knowledge of question and need spectrum from research to practice.
- o this would necessitate two populations of people in the library at all levels because the retrieval of data is for different purposes. If this happens, I hope the two can also remain interactive; otherwise, how do you apply the research discovery to the clinically applied situation?
- o I do not think this will happen.
- o overlap would be fantastic. Doubt any real value. (The research of yesterday is the practice of tomorrow!)

Medical Informationist

- o would need research specialists to define which information is appropriate for which section; advise users and update access systems to information; maintain "broad" touch with science to understand where activity is and where it is going.
- o health specialists who would focus on delivery care versus research in health care.
- o this is an essential function that is not now being performed. Persons will have to be trained in the science and art of extracting the essentials from information for practitioners, while at the same time preserving the integrity of the storage of research data. In fact, the success of most of the programs in this series hinges upon the training of persons in this category.

Information Scientist

- o Identification of user "interest profiles". Early notification to user of new available material.

#35 Widespread utilization of equipment for rapidly retrieving selected information from stored microform material--computer-controlled searches.

Medical Librarians

- o learn to access system; teach users.
- o conduct searches as intermediaries; teach users.
- o instruct on use of the system. Decreased number of manual searches, collecting and cataloging stored reservation material.
- o searches will be carried out by users (if in person in library).
- o assist in design of microform system, including design of random access system.
- o assist users; conduct searches. Need good knowledge of system.
- o develop improved capability for searching. Where the system is well-designed, there is no need for specialists!

Technicians (Equipment)

- o maintenance of system.

Technicians (Microfilm)

- o this is a technical problem which would require more technical people on the library staff. We helped develop one of the first computer-integrated fast microfilm retrieval systems. The "down time" of this equipment required almost constant supervision by a person who knew how to maintain the equipment.

#36 The capability of existing information retrieval networks, such as MEDLINE, will be improved to the point where data, tables, graphs, etc. can be retrieved from scientific publications.

Medical Librarians

- o none expected.
- o additional responsibility to serve as intermediary.
- o will enhance library's value to the user; need more persons who are skilled system users (searchers).
- o conduct searches; train users.
- o instruction in use of system. Increased use of system, decreased use of stacks.
- o better knowledge of data formats and uses. Ability to negotiate precise types of questions. Ability to develop deep subject ordering systems.
- o improved ability to promote effective use of MEDLINE capability and mediate in the computer transaction.
- o more apt to affect operations within a hospital, physician's diagnostic room, etc.

Technicians (Equipment)

- o detailed operation and maintenance of system.
- o the state of the science makes it possible now. It is just another type of technical skill that will be necessary within the walls of the library. Sophisticated equipment needs continued surveillance. People who can repair it must be on the premises. This will be most important.

Technicians (Library)

- o increased photocopy service.

#37 Existence of a number of information centers and networks each providing access to literature and data related to a fairly specific medical subject area, e.g., a drug information network, cancer information network.

Medical Librarians

- o none, except "specialist", i.e., one who becomes very familiar with the areas.
- o knowledge of center and networks.
- o need more skilled searchers, persons who can use terminals.
- o service as clearinghouse or referral center to connect people to appropriate network either (1) as intermediary or (2) by referral for patient to use himself.
- o be expected to know each such project field in some depth. Hence, subject specialization in reference librarianship is conceivable.
- o sub-specializaiton of reference librarians according to subject matter.
- o improved capability for formulating requests for service.
- o I hope this will not occur. Medicine should not be fragmented again.
- o knowledge of methods, needs, etc. of each medical subject.

Managers/Directors

- o ability to supervise and manage personnel with diverse subject interests and to direct systems aimed for specialized use.
- o development and maintenance of resource file or files.

Medical Informationist

- o training in design and operation of specialized information systems.
- o drug information I have mentioned in item 8, where I pointed out the possible expanded role of the pharmacist. The kinds of expanded duties to the librarian will relate more to the kind of health professional involved than the librarian himself. e.g., a cancer information network obviously must employ people who are specialists in cancer.

#38 The principal means of accessing health science literature will be through the use of on-line interactive terminals, such as those planned for MEDLINE.

Medical Librarians

- o knowledge of access and inventory of resources.
- o need more persons trained to use and teach use of system.
- o instruction in use of equipment. Decreased use and thus requirements for journal collectors.
- o impact on traditional library access tools (e.g., catalogs, indexes, etc.)
- o this will still need back up of text, because reference only will be received; therefore, need development of random access retrieval of microforms.
- o knowledge of how system works.
- o improved ability to promote effective use of MEDLINE and to mediate in the computer transaction.
- o develop means to insure document delivery.

Technicians (Equipment)

- o detailed operation and maintenance of equipment.
- o need computer technicians. It might be possible for librarians to receive additional training in computer technology to service this function, since the accessing of available information is quite different from the preparation of information to be accessed.

Systems Analyst/Programmers

- o some jobs will be essentially teaching people how to use the systems and helping them use them.

Managers/Directors

- o design and implement

Medical Informationists

- o the technical staff will be added to library staffs. The only people who have the knowledge to get the material into a computer are the health professionals themselves. This will be done I think from their own setting, not the setting of the library.
- o need content experts.
- o able to semantically summarize research papers for machine storage.

#39 Common use of picture telephones, located at library facilities, to gain access to data banks such as card catalogs, technical abstract bulletins, and so on.

Medical Librarian

- o none.
- o this, like many other new developments, will usually be employed directly by user. Librarian's new task will be as instructor of users in the utilization of these new resources.
- o CRT terminal, but not picture telephones. Librarians will teach users.
- o instruction in use of picture phones. Decreased use and therefore need for written material.
- o present catalogs will have to be "cleaned up" to make data accurate. Development of formats other than standard catalog for scanning, e.g., C.O.M.
- o knowledge of how system works.
- o development of display formats, mediate user-facility interaction.
- o I do not believe this will occur.
- o does not require picture telephones. No personnel impact.

Technicians (Equipment)

- o instruction in use of picture phones. Decreased use and therefore need for written material.
- o I believe the duties of such people to be added will be split between a new kind of technician in the library, and the telephone companies. When the operation gets big enough, the telephone company may place people full time at the library. It will depend to a large degree on the "down time" of such equipment. These kinds of people will probably still belong to "The Bell System."

System Analysts/ Programmers

- o Development of search and locator algorithms.

#40 Existence of a national computer-based union list of serials providing rapid access to location information.

Medical Librarians

- o need more persons skilled at using MEDLINE and similar systems.
- o may be expected to increase volume of interlibrary loans.
- o need to "clean up" files so that data has current accuracy. Development of regional cooperation and institutional specialization in holdings.
- o knowledge of how search system works.
- o formulation of queries; requests for service will need to be improved.
- o no impact.

Technicians (Equipment)

- o this will not necessitate people with special duties over that of computer retrieval. It is just a matter of how the material was programmed and how you wish to retrieve it. Once you have computer experts (technicians, etc.) on the library staff, this specific event will not require a different breed of cat.

#41 Achievement of agreements on standard elements, formats, contents, etc. in biomedical computer-accessed data banks.

Medical Librarians

- o will make life a great deal easier for librarians and users, but should not create new tasks beyond the original learning of the standard forms.
- o if it ever happens, it will reduce the number of different systems librarians will have to learn, but don't hold your breath.
- o instruct users in standards. Indirectly, increased application of data banks.
- o ability to input personal expertise re. questions of information organization and classification. This will assist standardization.
- o since librarians are by the nature of their training, already accustomed to standards and procedures, it would seem unlikely that additional special training in this area would be needed.
- o no impact.

Medical Informationist

- o this may not involve librarians. Health professionals must come to agreements on these points, e.g., only biochemists, specifically enzymologists, can finally agree regarding systematic nomenclature of enzymes. Once there is agreement, standard programmers can put the data in the bank.
- o to establish and regularly update national standards for recording clinical data.

#42 Establishment of cooperation between Index Medicus and Excerpta Media.

Medical Librarians

- o once they have recovered from their amazement, there should be no new challenges for the librarians.
- o none.
- o I would think this would only require agreement and working together of these two groups. Once this is accomplished, the librarian only has to be familiarized as to what cooperative arrangement was agreed upon.
- o recognition of shifts in coverage over time--ability to formulate search procedures that change as one goes back in time.
- o none (that I can appreciate at any rate).

#43 Acceptance of NLM book classification and MESH headings as a national standard for use by all medical libraries.

Medical Librarian

- become familiar with NLM classification and MESH headings.
- more detailed understanding of NLM classification and MESH.
- make job easier, but no new requirements would be created.
- will not happen.
- recataloging.
- compromise. Give up sense of local anatonomy and realize they are part of national system.
- the local librarian needs only to be kept informed. Perhaps specific librarians would be specifically interested in the establishment of a national standard. They might play a consultative or ad hoc role in the process.
- added complexity would require a lot of recataloging.
- barring complete retro-fit, this would require working with a multi-structured collection.
- it would appear that this is already underway and is a normal part of a library activity.
- would simplify work but would not change duties or responsibilities.

#44 Existence of a nation-wide system for cataloging and indexing medical documents, e.g., medical records.

Medical Librarians

- o relieve task of original cataloging. Would have to learn access system.
- o no affect on librarians.
- o instruct users in new system and its relationship to previous system. Conversion of existing files (not medical records).
- o reduced numbers of catalogers will be needed.
- o will have to learn how medical record systems work. Must learn to work with medical record librarian.

Medical Records Librarians

- o may have regional computer "depositories" and computer network arrangements for access plus arrangements to transfer records from one region to another when patient moves. Will permit all health care providers to have access to patient records. Result will be a major reorganization of health record system and procedures.
- o under present professional jealousy and protocol, librarians and medical records people are separated. Unless the two develop some form of cooperation, they will be ineffective in message delivery with the consequence that another group, information scientists, will take over dynamic functions of both groups.
- o again, I think this is more a function of the medical records section of a hospital, not a library. This is where the data is collected, where it is needed, and is the most likely place where the physician wants to retrieve it. Therefore, I do not see expanded roles for the duties of the medical librarian here.
- o will have to learn how system works.
- o until an abbreviated standardized system for medical records is available, it does not appear likely that much additional progress will be required or possible.
- o this would be a part of the medical record effort which usually involves a totally different staff.

Systems Analysts/Programmers

- o to develop and constantly improve algorithms for accuracy of input, validity of recorded data, probability of occurance, utility of output.
- o to constantly improve the information processing software.

Medical Informationist

- o to develop and constantly improve a common, stable, controlled medical language.

#45 Identification of specific medical libraries as centers for the location and use of independent study materials in selected medical content areas.

Medical Librarians

- o supply information to user on access and availability. Assist in categorization of new materials.
- o will need to know existence of and how to operate such centers.
- o will need to become familiar with content and recommended methods for using these materials, including the operation of the technology required. May require new, specialized personnel.
- o increased training in specialty area and its vocabulary required. Cataloging in more detail required. Increased use of the library as a study center.
- o emphasis on specialization in reference work.
- o necessity in some cases to build on higher level of subject knowledge for specialized information centers.
- o independent study means that instead of 100 students studying one thing at the same time, there are 100 students studying 100 different things at the same time. In terms of reserve material in the library, whether in books, audio-visual material, or CAI material, this will probably complicate things for the librarian, probably more in terms of the number of people involved rather than their kinds.
- o maintaining good personal relations with counterparts in control of increasingly valuable resources in the special collections.
- o being able to effectively mix the reference and referral modes.
- o negotiating and accommodating to recognition that one's own collection should not be "balanced" in the traditional sense.
- o knowledge of methods, needs, etc. of persons working in each medical subject.
- o it is my feeling that libraries will have to be decentralized, either electronically or physically, so that materials are available to the users at the point of need rather than in the classical concept of going to a center.
- o the same health professionals need access to different content areas without having to go to a different library.

Medical Informationist

- o this points up the need for specially trained people to assist content specialists in the preparation of independent study materials.

#46 Existence of computer-based regional catalogs providing access, at any individual library, to the holdings of all libraries within a region.

Medical Librarian

- o provide instructions, i.e., use; advise and cousel users. Add/ delete new information to the system.
- o less original cataloging; more use of centralized data via CRT Terminal.
- o more inter-library loan activities, possibly by distributing xerox or microfilm copies rather than loaning original.
- o increased inter-library loans. Maintaining current interaction with system.
- o inter-library loan traffic to grow. Library resources planning to become more cooperative.
- o complete and basic knowledge of computer and information systems analysis so that librarian has a capability in systems development. It may be too late already.
- o again, the duties of the people involved will not be different so long as computer based catalogs of any type are available in the library. The kinds of people involved are the same -- it will only possibly alter their number.
- o knowledge of how search system works.
- o maintaining good personal relations with counterparts in control of increasingly valuable resources in the special collections.
- o being able to effectively mix the reference and referral modes.
- o negotiating and accommodating to recognition that own collection should not be "balanced" in the traditional sense.
- o I see no essential difference in the requirements for a librarian to perform this function and any other normal library function.
- o entirely feasible, but does not require changes.

#47 Medical libraries, in cooperation with biomedical communication centers and educators, will assist in the design, production and presentation of instructional material.

Medical Librarian

- o librarian will require expertise in design and evaluation of curriculum; will need insight into the determination of the impact of instructional materials on educational objectives.
- o knowledge of factors involved in the "design, production and presentation" of instructional material; assisting in the preparation of instructional material.
- o rapid development of competence in curriculum and message design, and an understanding of learning theory, experimental design and medical education.
- o knowledge of the fundamentals of educational planning, use of media.
- o much more liason with the instruction staff, i.e. faculty.
- o familiarity and modern methods of research in education. Cataloging of available material.
- o this is not a library function!

Instructional Specialists

- o familiarize self with curriculae, curriculum aids, etc., in health disciplines. Demonstrate library resources to students and faculty, including "new" acquisitions.
- o libraries would have to have staff with competence in educational design and utilization, which they do not have now. The job implications will be to serve as advisors to students on selection and use of these materials.
- o will have to know considerably more about learning processes. New type of people will be needed for this, not now employed by library.
- o development of tolerance so that librarian can catch up to him in this field and bring to bear his own competences in the design task.
- o to watch the psychologic aspects of learning and to detect conflicts with the student's hereditary schemata.
- o a small cadre of people have already been trained, and more are being trained, in the science and art of the design of self-instructional materials. These persons act as an interactive bridge between content specialists and producers and are an essential link in the chain. The medical library must play an increasing role in this creative process and might well serve as the feedback mechanism from the user to the creative or production chain.

Medical Informationist

- o to design better teaching programs, to motivate the student in a man-machine symposium.

#48 Medical libraries actively will be involved in supporting continuing education programs in the health sciences and supporting adult education programs in such areas as preventive medicine.

Medical Librarian

- o many audio and video cassettes available for retrieval demand for patrons; many indexing and cataloging problems for audio/video materials.
- o increase holdings in these areas -- develop cataloging system. Refer users to appropriate information.
- o will require basic change in attitude and in position of power on part of profession before it can be significantly involved in this process.
- o "live" presentations for continuing education will probably not involve the library. If the "live" performance had been taped, then the stored tape may be cataloged and retrieved from the library. Consequently, the duties involved are those for storage, cataloging and retrieval.
- o sub-specialization of librarians according to medical discipline.
- o being responsive to more diversified needs. Able and willing to handle less sophisticated materials. More personal contact with more different kinds of people.
- o to develop computer-assisted educational programs, individualized and monitored for efficiency.
- o no changes implied.
- o capability to lecture to consumer groups.
- o it is my general impression that medical libraries are already actively supporting these programs.

Instructional Specialists

- o depends again on whether library becomes a true "learning resource center" versus a repository for books and journals. If it becomes a "LR" center, then a variety of new personnel or variations in the jobs of existing personnel will occur, i.e., CAI technicians, programmers for computer curriculae, etc.
- o would have to staff library with persons competent in educational design and utilization.
- o new type of people will be needed for this.

Medical Informationist

- o clinical research will require regular updating of all practitioners supported by an electronic information retrieval system.

#49 Libraries at health profession schools will be converted to dynamic "learning resources centers" providing a wide variety of multi-media instructional material.

Medical Librarian

- o will need to be more actively involved in the educational process.
- o librarians will have to learn to function as experts on, or simply list, instructional materials.
- o many audio and video cassettes available for use by patrons; many indexing and cataloging problems for AV materials.
- o instruct users regarding variety of material available and operation of equipment. Catalog materials.
- o develop competence to mediate between user and material. Develop competence in "re-packaging" material. Develop better knowledge of instructional process in medical education.
- o this is highly speculative and is contingent upon an entirely new attitude on the part of contemporary librarians. Many learning resource centers are being constructed independent of the library as a result of the librarian's inability to become a dynamic part of the creative process.

  Training in librarianship might well include involvement in the constructive and creative processes of media, as opposed to the housing, cataloging and dispensing of prepared materials. It might also include course work in curriculum planning and design, and in evaluation.
- o much more liaison with faculty.

Technician (Equipment)

- o the carrel, in addition to being a place to read, will also be a place to review pre-recorded audio/visual tapes. This will necessitate the presence on the staff of people who know how to maintain and repair this equipment.
- o need variety of content experts.

Instructional Specialists

- o instruct student on use of CAI. Acquaint self as resource person with new CAI programs. Aid faculty/staff in planning, evaluating, learning via CAI.
- o new type of person required, one with educational skills.

#50 As part of a national educational network, certain libraries and/or biocommunication centers will be selected to catalog and distribute multi-media instructional packages in selected content areas.

Medical Librarians

- o increase responsibility of distributing materials to regional and local institutions.
- o new areas for cataloging and coordination will require people with skills and knowledge in these areas.
- o much more library involvement with audio-visual materials.
- o increased training in content area and its vocabulary will be required. Cataloging and distributing multi-media instructional packages.
- o rapid development of competence in curriculum and message design, and an understanding of learning theory, experimental design, and medical education.
- o on the supposition that these libraries will have to continue their "general" library functions, in addition to these "selected" functions, then when event occurs, individuals will be needed to handle these specialized functions. In training, though, they probably won't have to have any special attributes that conventional library personnel don't have.
- o sub-specialization of librarians according to medical discipline.
- o increased ILL activity; need to be able to effectively mix the reference and referral modes; need increased negotiating skills.

Technicians (library)

- o review new instructional packages and classify as directed. Don't believe regional centers will have autonomy in this regard.
- o distribute, receive and arrange repair of all instructional packages.

Communication Specialists

- o undesireable event. The same health professionals need access to different content areas without having to go to a different library. Would need computer access to bridge the geographical problems.

Instructional Specialists

- o need new type of person, one who is knowledgeable in education.
- o the biocommunications specialist can assist the content specialists and the producers by bridging the gap between the two that exists at the present time. However, if wide distribution of multi-media instructional packages is to be contemplated, there must be input into the creative process of preparing materials from a cross representation of the users. Self-instructional materials prepared at one university, for instance, are seldom accepted at another; and yet in cases where a multi-representation of universities has been involved in the content preparation, the instructional packages seem to be well accepted by all.

#50 (cont.)

Medical Informationist

- o special clinical research centers will evolve to analyze the national (pooled) data base for further clues. Intensive development of bio-statistical methods to detect subtle correlations.

#51 Many, if not all, medical schools will employ an individual trained in "Educational Communications" who will function as an educational advisor to the faculty, and who will be considered a highly respected member of the faculty.

Medical Librarian

- o none. This person will not be assigned to the library unless it becomes a Learning Resource Center.
- o will have to relate to such a person and to provide library backup.
- o unlikely to require change in responsibilities in libraries.
- o work with the "Education Communications" person to make available and, to some degree, develop packages.
- o if librarians wish to function in this capacity - and I think they should - then many will have to obtain an M.D. or PhD degree in some biomedical specialty. Otherwise, the skills of traditional librarianship are really rather minimal - centered about organization of information and knowledge of information resources - then this does not entail a large block of additional background.
- o suffers a downgrading in status.
- o consulting skills, e.g., helping faculty define the problem and finding resources to solve it, rather than acting as a cataloguer.

Instructional Specialist

- o need person knowledgeable in education.
- o this person, in order to operate successfully and on a peer level in the medical school, will need either an M.D. or a PhD in Biomedical specialties plus his background in educational communication.
- o as described previously, this person will act as a bridge between the content specialist or faculty and the technical services required to perform the production of a teaching module. Such a person should have good training in all facets of communication and definitely must be a faculty member.
- o if this occurs in the library, then the event describes the type of duty such a person must have. I personally believe this individual will develop outside of the library area.
- o be desirable in addition to above to have similar person on library staff.

Medical Informationist

- o Need experts in medical content areas.

#52 Common use, for medical education, of computerized clinical encounter teaching systems, or on-line diagnostic games.

Medical Librarian

- o will not relate to libraries.
- o instruct users in the operation of the teaching system.
- o minimal affect on librarians unless they have competence and desire to undertake tasks - they should have, but usually don't.
- o we have this at our institution and it has not changed much the duties of our librarian.
- o more contact with clinical environment and clinical faculty.
- o this is probably unrealistic at the present time, in spite of several noble efforts that might seem contrary.
- o no library impact unless terminals housed in library and supervision of same done by library personnel. Does not require new responsibilities except to keep equipment in working order.
- o familiar with modern methods of Research in education. Cataloging of available material.

Technician (equipment)

- o detailed operation and minor maintenance of system.

Systems Analyst/Programmer

- o greater requirement for expertise in the clinical areas.

#53 Widespread use of video disks and/or cassettes for medical education, to include both the education of medical professionals and the lay public.

Medical Librarian

- o no change unless these are stored, repaired, replaced and maintained in libraries.
- o library will store and distribute this material.
- o serve as advisors to students on selection and use of instructional packages. The particular technological medium for presentation of instructional materials is not especially significant for job duties.
- o cataloging of material; notify users of the availability of the educational material; instruct users in equipment operation.
- o better understanding of the role of the visual image in the educational process -- in fact better understanding of the role of any medium (print, etc.) in this process. Unfortunately, the probable impact will be minimal because video cassette, etc. will be dealt with as just another package to be labelled, stored, and controlled.
- o these will be produced outside of the library, but will be stored, cataloged, and retrieved from the library. Therefore, cataloging and retrieval systems will be the responsibilities of the library staff.
- o familiarity with modern methods of research in education; able to develop/maintain catalog of available material.

Technician (Equipment/Media)

- o receive, maintain, replace tapes, etc. as well as distribute.
- o the maintenance of the tapes, duplication of them may or may not be a function of the library. If it is, then, of course, personnel concerned with the maintenance of such audio-visual equipment will be needed.
- o servicing may require technical support.

Technician (Library)

- o assumption is that an intelligent individual can use the device (should be no more difficult than microform copying reader).

Instructional Specialist

- o will have to know substantially more about learning process. New type of people will be needed for this; they are not now employed by libraries
- o I think it is a mistake to assume that any specific piece of hardware will or will not be of value. Any of the various presentation modalities are potentially valuable if the correct programming of information can be deduced for their proper utilization. The key is not the hardware, but rather the information specialist who must adapt content information to contemporary use.

#53 (Continued)

Media Specialist

- o much more contact with instructional staff (faculty); be responsible to more diversified needs; able and willing to handle less sophisticated materials.

#54 Common use of dial access systems as a means of supplying information to health care consumers.

Medical Librarians

- o will supply bibliographic backup to users preparing item paper.
- o if libraries are to be the repositories of the material which will be accessed in this manner, then librarians will have the tasks of cataloging, updating, etc.
- o librarians may be managers/operators of public dial access systems.
- o if part of medical library, operating system and instructing users. Assist in the process of updating information.
- o because of "tunnel vision" and unwillingness to deal with "popular" or community medical systems, librarians will probably be bypassed in these developments.
- o liaison with local medical societies.
- o no library impact.

Physicians/Health Care Providers

- o health professionals will be needed to produce the tapes. If the information is non-recorded, then of course the health professional will have to be in the library. Ability to define areas of interest so that appropriate (high need) resources can be made available (i.e., survey research skills).

Technicians (Library)

- o this, of course, is present in many cities now. If it is of a pre-recorded type, then the telephone company and a pre-recorded message is what is needed. The librarian, of course, or his personnel will be responsible for the pre-recorded message as well as the equipment at the receiving end.

Medical Informationist

- o public education will be the major thrust of the next 5-10 years.

Media Specialist

- o more contact with faculty; responsible for more diversified material.

#55 Use of minicomputers in many medical libraries as a dedicated, stand-along teaching machine.

Medical Librarians

- o libraries would have to have staff with competence in educational design and utilization, persons who are not now on library staffs. The job implications will be to serve as advisors to students on the selection and use of equipment and teaching materials.
- o instruct users in the operation of the system.
- o maintain and catalog library of programs used by the machine.
- o development of analytic systems knowledge and sensitivity to systems constraints.
- o ability to define needs precisely and in language for analyst and/or programmer.
- o possible need to develop librarian-programmers, because most programmers trained in quantitative data processing have little sensitivity for "alpha" problems.

Technicians (library)

- o review new instructional packages and classify as directed.
- o distribute, receive, arrange for repair of all instructional packages.

Technicians (equipment)

- o again, will require personnel in the library familiar with mini-computers. If electronic people are budgeted to another unit then the library won't need them.
- o in some instances, mini-computers are an integral part of a CRT. If so, then computer people of the type described previously will be needed.

Communications Specialists

- o requires personnel to instruct in use of equipment and trouble-shoot user difficulties. This is somewhat more complicated than using a terminal (depending on mini-computer installation) but of approximately similar difficulty.

Systems Analysts/Programmers

- o computer tasks will become part of library responsibility - will mean new type of staff as well as retraining of the old staff.
- o computer competance will be needed.

#56 Development of a universal programming language for computer-assisted instruction. Would run on processors of different size and manufacturers.

Medical Librarian

- would be an incredible advance from the perspective of instructional designers and programmers, but would not add or change tasks for librarians.
- no direct impact -- other than if library is using CAI, more programs will be available.
- use of CAI for information orientation programs and for question negotiation.
- develop programs suitable to given library situations.

Instructional Specialist

- not likely to be hired by library, but should be present in major health education facility.

Systems Analyst/Programmers

- if I understand this event -- the nature of the "language" will not make a big difference -- programmers will still be necessary and should be "conversant" in the various computer langauges.
- more familiarization with details of medical subject matter.
- reduces requirements for multi-computer language skills on part of programming staff.

Other

- a special COSATI to standardize approaches. Sponsored by National Library of Medicine.
- won't happen.

#57 Development of a universal graphics package for computer-assisted education.

Medical Librarian

- would not add to or change tasks for librarians.
- no direct impact - although will increase use of CAI.
- use of CAI for information orientation programs and for question negotiation.

Physicians/Health Care Providers

- faculty or health professional input is what is vital here. Health professionals must develop the subject material of the packages. Once developed, the librarians and his staff will store, catalog and retrieve. I can't see, for instance, an "internist" being appointed to the library staff.

Systems Analyst/Programmers

- some unburdening.
- reduces need for programmers.
- makes any intelligent person capable of developing a graphics display at the terminal without special programming skills.

#5% Much more formal training of the practitioner after the M.D. degree, conducted through a variety of channels from audio-tape/cassettes, closed-circuit TV to office and to special extension classes.

Medical Librarian

- o increased use of library will impart additional burden on reference and circulation librarians.
- o serve as advisors to students on use and selection of materials.
- o collect, catalog, store learning resources -- maintain current index of materials.
- o increased use of educational material -- library's facilities.
- o participation in the design and dissemination of packages in continuing education efforts.
- o once produced -- the library may well store, catalog and retrieve. What role the library will play in the formal training of the practitioner after the M.D. degree will probably come more from a department of continuing education.
- o if it does originate from the library, then the librarian and his staff must have the transmission facilities as well as the staff (technicians, electronic engineers, etc.) to do the job.
- o sub-specialization of librarians according to medical discipline.
- o more stress on matching materials to needs and capabilities of users.

Physicians/Health Care Providers

- o I believe these packages, because of their subject content, must be developed by the Health Professional.

Instructional Specialists

- o new type of person required, one who knows more about learning process.
- o scattered throughout the country, information experts and clinical informationists will form an intellectual network to develop high quality computer-assisted plans. Conducted under National Library of Medicine sponsorship.

Managers/Directors

- o more complex technology/service system management responsibility.

Other

- o this is not likely to occur. The need for formal training for post-graduate M.D.'s will be locked into whether or not we require compulsory re-licensure.

#59 A steady increase in the supply of librarians in relation to a fairly fixed supply of jobs will result in an excess of manpower for health science librarians.

Medical Librarians

- o excess librarians may undertake extra training to manage the new educational activities which will fall within the library's responsibilities.
- o fewer jobs/lower pay/lower status.
- o with increased responsibilities/duties of librarians; doubt this would occur -- if it did, librarians would further expand their job duties, especially in reference to biomedical communication technology and education.
- o the talented minority will, through personal education and ability, develop a high level of interaction with their publics through the variety of media, and research and educational concerns.
- o the majority will gradually become "sub" or "para" professionals in everything but name.
- o some of these persons will be employed by the library and some by the "office of educational resources." Whoever is on the library staff, e.g., programmers, computer experts, electronic technicians, etc. will be helpful and necessary for the educational process.
- o greater sub-specialization.
- o increased research to increase effectiveness of library resources, i.e., need for research skills.
- o more tasks, status, pay, etc. for computer-oriented and AV librarians.

Medical Informationist

- o a portion of the persons now studying Health Science Librarianship should be retrained or their energies diverted into the various other channels as covered in this report. This should certainly obviate the problem of a surplus for the foreseeable future.

Managers/Directors

- o more challenges from below.

#60 At most, if not all, medical schools students will be taught the contemporary modes of access to all biomedical/health information.

Medical Librarian

- o education of library users.
- o librarians may have the new tasks of contributing to this instruction.
- o once suitably educated, the medical students will likely want to function more independently than present students when using the libraries. This will require the librarians to relinquish control.
- o will have to adapt to new technology or be bypassed entirely by the more sophisticated user clientele.
- o participation in training programs.
- o increased use of facilities.
- o expansion of skills into relevant areas.
- o rapid development of competence in curriculum and message design, learning theory, experimental design and medical education.
- o if this event occurs, the training of librarians is such that they may be very helpful in the hospital setting, particularly in the patient record department.
- o library personnel will assume greater visibility as faculty, guiding independent study efforts.
- o need for counseling skills.
- o this is essentially being done at the present time.

Instructional Specialists

- o instruct medical students/health professionals in modes of access.
- o categorize new data for the systems.
- o development of tolerance so that librarian can catch up in area of instructional technology and bring to bear their own competences in the design task.

Systems Analyst/Programmers

- o becomes teacher, in addition to other skills required.

Information Scientist

- o lecture to medical students on methods for accessing library resources.

Academic Faculty

- o familiarity with "external memory," i.e., able to remain effective in an electronic environment.

#61 Continued diversification of health-care vocations, including more paramedics, after the Chinese model.

Medical Librarian

- o no change predicted.
- o may increase the proportion of requests from inexperienced library users - requiring more assistance to individuals and possible increase in group orientation programs.
- o provide access (consulting service about) a wide range of instructional materials in a variety of media - aimed at different health-care occupations.
- o medical library material will have to increase and provide for increasing types of audiences - more library material (volume) will be handled. Given the diversity of material, librarians will have to aid users in selecting material suited for them.
- o higher level of decision-making and educational interface.
- o need to become a facilitator of communication rather than mover of packages.
- o more sensitivity to user capabilities and motivation in the materials search and selection process.
- o shift in criteria away from research-oriented materials toward clinically-oriented materials.
- o familiarization with new job descriptions of paramedics.
- o participation in education seminars for paramedics.
- o cataloging of new paramedical journals.

Physician/Health Care Provider

- o public will use paramedics for initial history taking, for general medical advise.
- o post-hospital follow-up will be taken over by paramedics.
- o public medical education will be an organized, purposeful program.

Technician (library)

- o development of basic reference and cataloging capabilities.
- o capability of assuming responsibility for technical operation supervision.

Communications Specialist

- o given diversification of health-care vocations, there will be greater need for communication, consultation and diagnostic assistance programs - hence the demands on the network and its personnel will be increased.

Medical Informationist

- o this activity will accelerate the need for persons trained in extracting usable information from the wide variety of publications available in the modern library.

#62 Medical librarians will become more like high-grade research librarians.

Medical Librarian

- librarians would then do literature searches for all varieties of health personnel. Librarians may assist scientists in writing papers for publication or books, monographs, etc.
- may be permitted to participate actively in the research process, providing specific information in relation to research design, methodology, instrumentation, etc. Will require more insight into the subject matter of the research.
- more responsibility for research, searches and cataloging. Duties will not include clerical aspect, which will be delegated to an assistant.
- ability to interact with machine-based information repositories.
- correspondingly higher responsibility for correctness of information supplied.
- assignment to special internal group, e.g., research librarian for Department of Surgery -- perhaps a joint appointment.
- in a traditional hospital library, information retrieval will be increasingly a matter of logic, proper use of a terminal, formulation of inquiries, interpretation of probabilistic answers. None of these facets forms the basis of selection of hospital librarians.
- more transformation of materials rather than just item identification.
- familiarization with scientific methodology of experimental research.
- familiarization with statistics and with computer science.
- higher sophistication in mediating information requirements of users

Technician (Library)

- will assume those duties no longer performed by medical librarians (e.g., shelving, ordering, accounting, etc.)

#63 More emphasis on medical sociology and biological science content in programs for medical librarians.

Medical Librarian

- o impact would be similar to that described under Description #62.
- o more close attention will be paid to the user populations as a result of a greater understanding of institutional structure and organization. Materials acquired will be more closely tailored to user interests.
- o a greater understanding will be derived of the motivation of the user and the use to which information will be put in the environmental context.
- o more concern with the entire process of medical communications, not just access to documents: concern with "invisible college" structure and how to link people to people as well as to documents.
- o increased responsibility for performing library research searches.
- o increased responsibility in assisting faculty in their research and planning their teaching programs.
- o similar to #62.
- o I assume knowledge (basic and applied) in biomedicine in all medical librarians.
- o knowledge of experimental design so they can better understand context of their work. Knowledge of alternative methods of delivering information (in contrast to fixed library). Information ≠ bibliographic information. Rather, information = substantive information.
- o no significant change as a result of this.
- o see #62.
- o librarians have to familiarize themselves with the new reference tools in their subject areas and condition themselves to include their subject areas in bibliographic searching.
- o develop the collection in their areas.
- o develop subject familiarity or expertise in their areas.
- o requires deeper familiarity with the details of health care delivery operations -- the "dynamics" of client groups.
- o familiarization with scientific literature in the field.

Technician (library)

- o will assume those duties no longer performed by medical librarians (e.g., shelving).
- o develop basic reference and cataloging capabilities. Also, assume responsibility for supervision of technical operations.

Academic Faculty

- o at our school, the faculty consists of "information scientists," e.g., hardware, retrieval strategy, information processing or coding experts. The interface between medicine and the library school is not stressed. "Medical justice" must first develop its own curriculum.

#64 Common acceptance of the requirement of a Ph.D. degree to become the Director of a large medical library.

Medical Librarian

- none.
- close collaboration in all planning, development and design of educational, support, and information systems for the unit.
- close collaboration in medical schools in design of courses, emphasizing especially the structure of messages.
- do not believe that this will occur.
- people will be trained for role they will not serve -- i.e., administration of library may need Ph.D. in management rather than library science.

Technician (Library)

- will assume what is traditionally conceived as professional librarian role. May need more work than present librarians in the role of question negotiation, i.e., communications.

Managers/Directors

- will participate more in the educational process of the institution; will be expected to be more sophisticated in management techniques; will be more "credible" in the institution on account of the doctorate.
- more pressure on libraries to assume roles of greater importance, responsibility and dynamically participate in health care affairs.
- "grandfather clause" required to protect a large percentage of medical librarians now holding these positions. An an alternative, initiate additional training programs for them.
- people in administrative positions will be forced to compete by enlarging their scholarly, as opposed to their managerial activities.
- would be given a faculty position on the staff of a medical school.

Academic Faculty

- more doctoral level programs in Library Science. (Alternatively, the doctorate will be in related fields, i.e., computer science, management, medicine or some other basic medical science).
- more library schools would develop doctoral programs if the Ph.D. was required for the job. The doctoral program must be in medical librarianship and not in the field of science; otherwise, few individuals would enter the library field.

Other

- shouldn't happen.

#65 More comprehensive and specialized training programs for health science librarians and other communication specialists.

Medical Librarian

- o better training will lead to greater involvement in educational and investigative processes. May be involved in such activities as: advising; performing specialized tasks, i.e., literature searches, writing, assisting in selection of learning resources for courses.
- o a greater skill and sophistication will be demanded of all librarians. The more detailed knowledge of a medical environment and the subject matter of the health sciences will result in a much closer alignment of the medical librarian with the clinical, educational and research processes. Marginal performers with less skill will be edged out in favor of those possessing the more comprehensive and specialized training.
- o development of a new specialty, computer consultant librarian, who will assist users who wish to access computerized information systems (e.g., MEDLINE and family).
- o assist faculty in their research and in the planning of their teaching programs.
- o clerical responsibilities will be delegated to assistants.
- o greater levels of responsibility in the various specialties in continuing education functions, etc.
- o see #61, #63, and #64.
- o role of Information/Instructional Technologist will merge with librarian, or the librarian will become a para-professional.
- o increased role as a teacher.
- o libraries will be in a position to provide expanded services to their customers.
- o will be required to engage in structured refresher training.

Medical Records Librarian

- o changing from manual system to electronic storage of medical records will create: (a) triple patient files, and (b) pooled experience files; the task is to interface with the current knowledge "bank".

Communication Specialist

- o assist faculty in specific use of communications and related computer systems.

Academic Faculty

- o diversification of programs at the Masters degree level with specialty training recognized at the library schools.

#65 (Continued)

Other

- it is assumed that existing biomedical knowledge (i.e., currently used textbooks) and abstracts of research reports will be organized into a "current knowledge" bank. Clinical medicine will be supported by: (a) past history of the patient (including genetic and social background), (b) aggregated experience with similar cases, (c) scientific and research data. Coordination of (a) and (b) with (c) will require careful planning and education.

#66 Development of more extensive continuing education for health science librarian.

Medical Librarian

- an increasing responsibility and high level of performance can normally be expected. More active participation in the activities of the parent institution.
- revision and upgrading library facilities to expand present resources and include new technologies.
- if education is in a medical subject area, changes predicted in questions #63 and #65 will occur.
- may become a requirement for promotion in rank, etc.
- See #61, 63, 64. This assumes that librarian is willing and capable of assuming more dynamic role. If not - I question if continuing education will make any difference.
- this would appear to be an extension of educational opportunities in the various schools of library science.
- seems highly desirable but I don't know how to bring it about except through strong action of the Medical Library Association! Perhaps they should offer certificates for continuing education activity as the AMA does.
- can provide expanded services.
- will be required to engage in structured refresher training.
- participation in education programs, with a fixed number of credit hours required.
- possible establishment of continuing certification exams, e.g., every five years.

Physicians/Health Care Providers

- need to be educated in role of information (total information) in decision-making, educational and empirical processes within which they operate. This may be the crucial factor in the whole bag.

Academic Faculty

- need to develop and train for new roles for librarians - i.e., information professions.
- need to be educated in role of information (total information) in decision-making, educational, and empirical processes within which they operate. This may be the crucial factor in the whole bag.
- teachers of continuing education for other librarians - especially staff in retrieval centers who will be responsible for upgrading local libraries.
- basic science faculty will teach basic elements of these fields to librarians.
- "information assistants" will teach coding, storage, retrieval in interactive mode.

#67 The medical education faculty will be trained in the use and preparation of multi-media materials.

Medical Librarian

- o if library is total learning resource center, then assist faculty regarding steps in preparation of materials.
- o librarians and communications specialists will contribute to this training, if they have developed the competence to deserve the respect of the educators.
- o as a consequence, Medical Education faculty will be more discriminating in their expectations of quality materials and services -- which will affect the level at which librarians and communications specialists will have to perform.
- o some libraries will include such materials; others will become components of "learning resource centers" with other divisions handling non-print media.
- o whichever way it happens, someone will have the job of helping students (whether formally enrolled or not) find that right audio or video cassettes or other materials. Much of the curriculum will be in self-instructional modules -- transferring much of the management of instruction from present instructors to the students and to "new role" librarians.
- o assist faculty in the selection, use, and development of instructional materials.
- o advise students of the availability and use of the multi-media materials.
- o catalog, store, ... materials.
- o closer interaction with faculty.
- o clearer definition of library facilities vis-a-vis instruction.
- o capable of working with faculty in design of messages in any format for educational use.
- o knowledge (not superficial) of disciplines and subjects within medical education.
- o in some settings, library personnel will be required to train ME faculty in the preparation of their materials.
- o will become more involved in multi-media material production and faculty training.
- o material must be acquired, cataloged, shelved and circulated.
- o material must be maintained.
- o librarian must be trained in the management of multi-media materials, assuming that the library will become the place where these materials are stored and used.
- o for media specialist, increased workload and more time spent consulting with clients.

#67 (Continued)

Communications Specialist

- o assist faculty in the use of the communications network and related teaching systems, computer-based or otherwise.
- o increased demands on systems and personnel.

Instructional Specialist

- o role will merge with librarian, or the librarian will become paraprofessional.
- o persons trained in the task of helping faculty members convert vaguely conceived ideas about content into clearly defined objectives and ultimately into systems designed to help students achieve these objectives.

Managers/Directors

- o the Office of Education Director will become more involved in health library management.
- o the Audio-Visual Services Director will become more involved in health library management.

Academic Faculty

- o more demand for, and use of, AV-TV facility for production, dissemination and utilization of multi-media materials.
- o to switch from classroom teaching to multi-media materials.
- o to encourage participating in national, organized teaching efforts. A good academician is the one who participates.

Other

- o primary responsibility to develop formal channels of information flow.

#68 Programs of library instruction will be expanded to include information/computer systems, instructional technology, communication media.

Medical Librarian

- o librarians will use these techniques and facilities far more in their daily work -- and will contribute to the instruction of others in their use.
- o assist faculty, students and physicians in the use, planning and development of these resources.
- o clerical duties will be delegated to assistants.
- o impact on library organization -- new categories of jobs and functions.
- o initial "function" would be to draw lines between responsibilities of libraries and instructional units.
- o well-trained specialists with advanced academic degrees will become faculty members in a new departmental structure.
- o reference librarians and systems analysts will be expected to more intensively coordinate their operations.

Communications Specialist

- o access to instructional programs as well as MEDLINE-type services will be facilitated by library "computer consultants".

Instructional Specialist/Information Scientist

- o develop educational programs for training librarians in the use of the newer technologies.

Medical Informationist

- o development of "instructors in biomedical data." While such persons do not seem to be readily available, it seems reasonable that they might be generated from the computer industry in a merged activity with the schools of education and library science.

Academic Faculty

- o familiarity with computer not only as data processer (library automation) but more importantly as augmenter of human brain, i.e., artificial intelligence.
- o develop capability with instructional technology and supporting communication systems.
- o more need for in-service trainers for faculty and other library personnel in the areas listed above.
- o will become obsolete if they do not expand programs into the areas identified and bring on new faculty competent in these fields.
- o the basic philosophy of these programs must change to incorporate this new technology.

#69 The concept of self-paced, self-instructional training will become common to medical education.

Medical Librarian

- o if these (computer instrument) centers are placed in libraries, then librarians may: (a) assist in selection, preparation, etc. of program material; (b) evaluate outcomes; (c) instruct students and other "users" of the system.
- o role of the AV librarian will expand to serve as the intermediary between the program/equipment and the users: i.e., the librarian will accept responsibility for care of the equipment and its use.
- o textbooks, as a consequence, will play a diminished role -- so libraries will either become the distribution centers for the self-instructional materials, introducing new cataloging, circulation and maintenance responsibilities for staff -- or, they will resist these new responsibilities and be left with a role of reduced importance in medical education. Examples of both approaches are already evident.
- o librarians will assume more responsibility for facilitating student access to self-instructional materials and hence will be drawn into more student counseling and advising roles.
- o assist faculty in the use and development of multi-media material.
- o instruct and advise students in the use of the material.
- o increased use of library facilities by faculty and students -- increased need for instruction in the use of the library.
- o same as #68.
- o same as #67.
- o increased responsibility for cataloging and retrieving educational materials according to educational need.
- o would require training in management of media, assuming that the library becomes a repository for these materials.
- o media specialist and systems analyst will be expected to more intensively coordinate their operations.
- o familiarization with computer terminals.
- o ability to access CAI programs through CRT terminals.

Communication Specialist

- o assist faculty in the use of the communications network and related instructional systems, computer-based or otherwise.
- o increased use of system; will increase need for personnel.

Instructional Specialist

- o will need persons trained in curriculum design, in objective writing and in communications; including skills in the media as well as computer fields.
- o new type of position, Director of Computer Assisted Education, will be created. Will work primarily with faculty to help them learn the local facilities and how to write material for their students to use in the manner indicated above.

#69 Continued

Academic Faculty

- o classroom lectures should be reduced to areas where the teacher's personality, conviction is the central issue (medical ethics, problem solving) or where the students' self-expression will be encouraged, to clear the emotional sphere of the medical student. Self-adjustment, self-evaluation, goal-seeking are some such issues.

#70 A variety of programs, computer-based and otherwise, will exist for self-examination, and will be for use by both students and practitioners. These will be available through the library.

Medical Librarian

- o as in #49 - prepare, maintain, instruct, evaluate, etc., examination materials.
- o will be required to accept responsibility for monitoring the usage of the programs in the library.
- o library staff will have to become familiar with both the modality and the content to assist the users.
- o it is likely that the staff will be faced with the new task of supporting users who feel unfairly treated by the evaluation materials. This may have to include serving as liaison between program writers and users.
- o assist faculty, students and practitioners in the use and development of these programs.
- o catalog, store, maintain -- programs and systems.
- o closer interaction with instructional faculty.
- o role in student and course grading/certification.
- o responsibility for aiding learner to select resource to meet needs identified in self-examination.
- o instruct students and practitioners re. how to use computer-based systems.
- o would have to develop some new procedures for material control.
- o ability to access CAI programs and instructionally-related materials via CRT terminals.
- o better performance will be expected of media specialist.

Physician/Health Care Providers

- o memory-based practice of medicine should be replaced by information-supported practice. In possession of the pertinent information, clinical judgment should become a scientific decision. Medicine should be practiced as a research activity, with rational decisions; self-examination as well as one's own performance evaluation should tend to better medicine.

Communications Specialist

- o assist faculty, students, MD's in the use of communications and related teaching systems.
- o increased demands on systems and personnel.
- o persons trained in biomedical communications will be required to interact between faculty content persons and production personnel in order to produce these modules.

#70 Continued

Systems Analyst/Programmer

- o increased need for library "computer consultant".
- o higher standards of performance will be required, particularly in the development of special-purpose materials and in matching such materials to specific user demands.

Manager/Director

- o scheduling of terminal access, especially immediately before the standard written exams (this is already a problem in our environment).

#71 Greatly increased demand for continuing educational material by practicing health professionals.

Medical Librarians

- o increased familiarity with materials which are available.
- o instruction of users.
- o maintain currentness (assist in) of material as well as cataloging.
- o librarians will need to have an understanding of the curricula and relevant materials. These materials must be made readily available to participants in educational programs by means of photocopy, interlibrary loans, etc. An increased workload will result.
- o development of better understanding of, and relationship with, the practitioner community. This will include developing services not customarily provided to the academic community: such as, telephone request procedures, delivery services, and others -- all of which will require new and/or different staff.
- o facilitate user access to CE material.
- o increased use of library facilities, will lead to greater demands on the facilities and personnel.
- o assist practitioners in the selection and use of appropriate material.
- o extension of the concept and practice of community service, to include more book materials.
- o capability to design messages in support of continuing education for health professionals -- in collaboration with medical educators. Need to manage alternative (to library) systems.
- o counseling, program development role for individual practitioners.
- o more qualified medical librarians will be employed by professional organizations where most continuing education will originate.
- o increased workload for reference, circulation and acquisitions librarians, combined with more stringent performance standards.
- o familiarization with new educational material.

Technicians (Library)

- o capability of operating systems for message dissemination to diverse audiences -- computer, video, standard A-V channels and devices.

Communications Specialist

- o increased use of network facilities, especially teaching systems - increased demands on facilities and personnel.
- o assist practitioners in the selection and use of appropriate material.
- o persons trained in biomedical communications will be required to interact with faculty content persons and production personnel to produce CE material.

#71 Continued

Instructional Specialist

- o role of Information/Instructional Technologist will merge with that of the librarian, or, the librarian will become a paraprofessional.

Academic Faculty

- o present courses are teacher-centered. Student needs are unknown. If a faculty member is recognized by peers, he will be asked to teach. He will chose the topic, he will try to be "brilliant". Knowledge transfer is inefficient; much of the transferred knowledge has little utility value. Participants of courses are often intimidated rather than encouraged. A completely new philosophy is required to elevate awareness, to raise knowledge level, to test existing knowledge level before the teaching begins, to focus on participants, not on teachers.

Other

- o eventually, on-line remote systems operations (for cont. education).

#72 At many universities, the development of a coordinated curriculum for physicians specializing in medical information science; for librarians to support clinical practice; for medical record administration; and for medically oriented communication scientists.

Medical Librarian

- o new tasks for librarians and communication specialists will include helping design and offer parts of these training programs, and contributing to efforts to evaluate and revise these programs.
- o hopefully, those who are the products of these programs will participate in future library activities, bringing a broader perspective than is now often available, expanding the frequency and quality of innovative activities.
- o more involvement of library in research and development activities of biomedical communication research and training programs.
- o increased demand and role of medical libraries and librarians.
- o assist physicians and other practitioners in the use of library resources and information handling.
- o will require change in role, with more direct interface with education, information, and communication interests.
- o all library personnel will assume responsibility for educating library users via workshops, courses, etc. in library science.
- o will have to learn how to teach.
- o more training for librarians in life sciences and clinical medicine.
- o more intermingling of library personnel with health care delivery personnel. Library people will have to "get out" of the confines of the library proper.

Communication Specialist

- o increased demand on communications systems and personnel.
- o teaching and developing instructional resources for communication science and medical information science curricula.

Manager/Director

- o closer coordination of libraries and collections in those universities with medical libraries.

Academic Faculty

- o if this concept spreads beyond biomedical area, will put them out of business.
- o strengthen role in education of information professionals. Need for continuing education on variety of levels. Already happening in limited way.
- o increased versatility to be able to accommodate to classes with such diverse backgrounds and goals.

#72 Continued)

Clinical Faculty

- o to separate scientific medicine and bedside medicine from informational aspects of medicine requires careful segregation of our clinical teaching efforts. After we have identified the information-dependent segments, a curriculum will emerge to improve information flow. At present, we try to make "mini-doctors" out of those who should specialize in information counseling. We teach what we can teach comfortably.

Other

- o I do not foresee that this coordination will take place.

#73 Hospital will take on an increasingly more important role in the education of all types of health science personnel.

Medical Librarian

- o don't feel this will be different from #62, #67, #69, or #70.
- o the size, quality and diversity of hospital libraries will have to grow -- with more and specially trained staff.
- o the educational support functions of the hospital library will require the same staff responsibility changes as listed on other pages for university health science libraries -- on somewhat smaller scale.
- o increased demand for and use of hospital library facilities -- leading to greater demands on facilities and personnel.
- o catalog, store and help develop required additional instructional resources.
- o hospital librarians -- if they play any role at all -- will have to be significantly upgraded. If this doesn't happen, then paraprofessionals should take over.
- o do not believe this will occur.
- o develop ability to facilitate link between hospitals and medical library.

Technician (Library)

- o may become responsible for hospital library operations.

Communication Specialist

- o more use of cable TV (or closed circuit TV) plus videotape or video cassettes; access to instructional material -- prime use for patients/secondary use for hospital personnel (patient education may grow to a significant information transfer function as health care management responsibility is transferred to patients and their families).
- o increased demand for and use of communication system -- leading to greater demands on personnel and for practical systems.
- o assist in the development of communication systems, related instructional resources.

Manager/Director

- o an increased demand for service and more active participation in the educational process. Will need to work more closely with the Director of Medical Education (DME) and the Director of Nursing Education, etc. More use will be made of AV equipment and materials.
- o develop working relationship (group dynamics?) with those less familiar wtih library functions.
- o increase and develop hospital library collections.
- o backwater hospital libraries would have to be expanded and their staff upgraded.

#73 Continued

Clinical Faculty

- hospitals will be increasingly expensive, and diagnosis/therapy increasingly complex. Hospitals will become responsible for technically complex follow-up. For instance, telemetry will protect many millions of cardiac cases, if a central agency with its computers can monitor them. Computer-assisted clinical practice will be quite different from ambulatory care. Hospitals will support superspecialities, whereas ambulatory care will move apart and will become a different type of practice.

#74 There will be a widespread development and upgrading of hospital librarians.

Medical Librarian

- o don't expect change.
- o necessary to perform functions noted in #73
- o major role as facilitator of access to larger network of information services--like to MEDLINE, etc.
- o development of quality hospital librarians.
- o clerical tasks will be delegated to assistants.
- o corresponding increase in functions and responsibilities (see #73).
- o significant role in educational efforts by hospital--including instructional design and development.
- o significant role in support of physician information needs.
- o do not believe this will occur.
- o if upgraded training will qualify librarians to become member of the health team, they may play a new role: assisting in conceptual formulation of algorithms. Such research-practice combining algorithms will be the new challenge of medicine, like animal experiments of the 1950's. Imaginative search for co-occurrences, for similarities, for patterns, for correlations will require highly polished logic and insight in retrieval methodology.
- o enlarge library collections and increase services.
- o required to participate in education programs; fixed number of credit hours required.
- o possible establishment of continuing education certification examinations, which one would take every five years or so.

Technician (Library)

- o probable that "librarian" will become para-professional.

Manager/Director

- o will participate more effectively in the operation of medical library resources. Will have more responsibility in support of educational programs.
- o more intense training for persons administering these libraries.
- o expand hospital library and upgrade staff.

Academic Faculty

- o an "in-service trainer" would have the responsibility for upgrading libraries in smaller institutions - See #68.
- o diversification of programs at the MA-degree level with specialty training recognized at the library schools.

#75 Common use at local hospitals of information systems for medical records, locally-produced data, and biomedical information of concern to the various professional specialities at that hospital.

Medical Librarian

- o personnel and skills to operate appropriate information systems.
- o most work presently done by librarians will be taken over by para-professionals.
- o more work flow; closer collaboration with information specialists; more contact with users.
- o itinerary work in hospitals--to catalog their educational material and to make them aware of central resources.

Medical Records Librarian/Administrator

- o place information from medical records on computer or other system.
- o organize and code "locally-produced data".
- o retrieve data and information for health professionals.
- o will impact on health record administrators, computer specialists and possibly on communication specialists--but not on librarians.
- o need skills in problem-oriented records.
- o need skills in management of data input and retrieval for computerized record systems.
- o developing data processing systems for medical records consistent with local resources and needs.
- o it is anticipated that the next steps in the evaluation will be: (a) regional health data centers, and (b) national network of regional health data centers. As national pooled experience becomes a reality, the objectives will shift. Local hospitals will begin to compare their own "outcomes" with the national experience. Differences will reflect differences in patient population and differences in quality of care. The Joint Commission will be able to analyze hospitals by means of their performance. Hospitals will depend more and more on the feedback loop of performance analysis. Biomedical information will be essential.
- o more collaboration with information specialists; more work flow; more user contact.

Communication Specialist

- o develop and use these systems.
- o instruct users in the application of these systems.

Systems Analyst

- o more contact with users; more work flow; closer collaboration with information specialists.

#75 Continued

Medical Informationist

- o the same basic problems of extracting information from the vast resources, available into usable components will have to be accounted for in this job classification. This information is all available at the present time, but we lack trained persons to put it into usable form.

Information Scientist

- o oversee information system operation at all levels in hospital -- including patient care, medical records, test data, operational data, and educational and research information and systems.

#76 More direct participation of information specialists in the clinical consultative process, particularly in hospital settings, as in the form of daily or periodic ward conferences.

Medical Librarian

- o perform literature searches.
- o advise M.D.'s of sources of data or programs as needed.
- o review new materials, data systems, etc.
- o better knowledge of clinical practice and substantive knowledge in clinical medicine fields.
- o will support clinicians with information, much as nurses supply surgeons with instruments, but with much wider latitude.
- o relating clinical problems to literature search, consistent with level of consumer or consultant.
- o participation on curriculum committees.
- o develop stronger collections more closely related to curriculum.
- o reference librarian would require more understanding of clinical procedures.
- o itinerary work in hospitals -- catalog their educational material and make them aware of central resources.
- o able to access information systems via local terminals.

Physicians/Health Care Professionals

- o once medicine begins to use external memory, and thereby enhances the scientific portion of decision/judgments, comparison of a case with similar experience will no longer be a sacred medical function. Physician will focus on therapeutic technology (surgery), diagnostic technology (x-rays, laboratory) on the data acquisition and patient documentation, and most of all, on humanization of the technology.
- o clinicians would have a responsibility to involve information specialists or cope with their input to the "medical rounds" process. I believe this would decrease the efficiency of health care delivery.

Communications Specialist

- o development and use of systems which provide the data required for conferences.
- o assist health care provider in the use of those systems and the interpretation of the data.
- o information processing-oriented experts will be invited to contribute to the diagnostic/therapeutic decisions, since in possession of "all" pertinent data, decisions will become largely non-medical tasks.

#76 Continued

Information Scientists

- o tasks will involve "trouble-shooting" problems in the communications process. Will need to comprehend the information and communication needs in the clinical setting and to invent new strategies for facilitating this process.

Other

- o do not believe this will occur.

#77 Establishment of one or more nationwide computer-based medical advisory services which make health care information and selected forms of diagnostic/treatment information directly accessible to the public.

Medical Librarians

- o place new data in systems.
- o selected, specially trained librarians will participate in the tasks of identifying public information needs, selecting sources for this information and helping organize its presentation.
- o function as intermediary for health care provider to find out which is best of available systems in light of local needs; function as local facilitator/coordinator of access.
- o assist in supplying required data, e.g., by working with health care provider and using library resources.
- o if system is accessed from the library, instruct users in its operation.
- o library may expect demand for materials that these services recommend; hence, it will be expected to be aware of their content, possibly provide bibliographic research support.
- o involved with networking and interfacing traditional information systems with those of a different nature, but handling basically the same kind of categorizable information.
- o this might increase the desire of the public, as opposed to the professionals, to make use of health science libraries. I believe this is probably a disadvantage, but it may be offset by the benefit of such an advisory service.

Physicians/Health Care Providers

- o education of the public is a long overdue task. Medicine has absorbed too much responsibility. Computer-based medical advisory service will break down the barrier between consumer and provider of care. The price of such a readily-accessible medical information system is, of course, the risk of overinterpretation, induced fears, "information diseases". The task of the health care profession will be to control the risk and seek out those who may be injured by the information system. The benefits will be much greater than the damages caused by the information system.

Communication Specialists

- o development and use of those systems.
- o assist health care providers in supplying the necessary data for the operation of the system.

#77 Continued

Systems Analyst/Programmers

- o development of privacy-control mechanism.

Managers/Directors

- o ability to participate on National Advisory Committees.

Medical Informationists

- o public health educators will have to be trained in the preparation of information to suit this purpose. This will require sophisticated knowledge of the information base of the general public.
- o translation of medical information into language usable by public.

#78 Establishment of a variety of media-oriented health care programs for use in public schools, libraries, home use, and so on.

Medical Librarian

- o place new programs in media.
- o evaluate effectiveness of programs.
- o advise and assist user in access and use of programs.
- o will be asked to determine the availability of such programs and to order them if they already exist.
- o participate in the tasks of identifying public information needs, selecting sources for this information and helping organize its presentation.
- o need for liaison between medical and public libraries - preparation of bibliography, etc. (also collection of materials) by medical librarian for use as special sections or services of public libraries.
- o assist in the development and use of media-oriented programs.
- o catalog, store, distribute programs to an "increased" audience.
- o library may expect demand for materials that these services recommend; hence, librarian will be expected to be aware of their contents, and possibly to provide bibliographic research support.
- o working with instructional technologists (or developing similar capabilities) in message design and package development.
- o develop interfaces with diverse organizations for information dissemination.
- o librarian will have to take on more of an educator role, become more of an instructional technologist.
- o see previous answers to #56 and #57.
- o imposition of more severe standards, and sanctions, on material selection.
- o knowledge of preventive medicine, media techniques and health education.

Instructional Specialists

- o assist faculty in the development of these programs.

Medical Informationists

- o need persons who can translate medical information into language useable by the public.

Information Scientists

- o develop and use communication systems necessary for the operation and delivery of the multi-media programs.

#78 Continued

Academic Faculty

- the current trend towards training Health education specialists in colleges and universities needs to include training in biomedical communications, so as to enable health educators to engage in the writing of programs for self study and for nonschool use.

#79 Certain types of learning resource material, especially patient records, will be machine cataloged and later on reviewed and evaluated for their value if incorporated into a course of instruction.

Medical Librarians

- o catalog resource materials and put data into machine.
- o assist users in access, study, evaluation of data.
- o librarians may have task of coordinating the storage, review and retrieval process. Will require new familiarity with these materials and the process of evaluation.
- o assist in the development of a coding scheme.
- o instruct users in the operation of the system.
- o collaboration with medical records personnel on system design, format, interface with traditional information sources.
- o cataloger will need to work with systems analyst on file structure problems.

Medical Records Librarians

- o collaboration with professional librarians.
- o this event would affect medical records librarians, not medical librarians.

Communication Specialists

- o assist health care providers and faculty in their use.
- o assist in the development of a coding scheme.

Systems Analyst/Programmers

- o development of more comprehensive file formats
- o engaged in development of privacy control procedures and safeguards.

Information Scientist

- o develop systems necessary for the conversion, review and evaluation of patient records.

Clinical Faculty

- o current teaching is at the conceptual level, and bedside teaching is to apply conceptual knowledge. All this could be eliminated if teaching would remain in real-life environment. Conceptualization creates theoretical patterns, and clinical practice is to force real-life events into preformed conceptual patterns. Real-life approach seeks real-life similarities for comparison. Therefore, patient care should be an ongoing comparison. Patient records will be the basis for medical practice.
- o would require more versatility in creating instructional units, i.e., more time in preparation of same. On the other hand, the teaching units would be based more on medical experience, and that would be a real advantage.

#80 Existence of biocommunication centers which have the mission of repackaging medical and research literature into a few high quality documents -- involved in the compression and integration of research findings.

Medical Librarians

- o none.
- o librarians will have the task of providing bibliographic backup services -- to identify and supply relevant documents for evaluation and synthesis by subject specialties. This will involve a division of responsibility between librarians and subject experts so that the latter can concentrate upon evaluation and synthesis. The librarian will supply documents necessary for the execution of analysis and repackaging.
- o assist health care professionals and faculty in the compression and integration of research findings.
- o more acquisitions and reference work.
- o a few of the better ones will participate actively in the process.
- o although this appears to simplify the task of the reference librarian, it also makes an entire new set of documents he or she must be familiar with!
- o will be required to provide more intensive and direct support to editorial and technical writers.
- o become familiar with computer science, statistics, and scientific methodology.

Systems Analyst/Programmer

- o develop a system for coordinating this process.
- o need to develop backup systems for literature, both to support the design of compressed documents and to offer servicing of needs after such documents appear.

Medical Informationist

- o new tasks are defined by the events itself -- all of which would be new.
- o subject matter specialists would prepare state of the art papers (or commission such papers and arrange for their publication - analogous to ERIC clearinghouse functions in education research).
- o those with biomedical background will be actively involved in developing these condensations.
- o as touched upon in so many of the other categories, the issue here is the training of specialized persons to extract the essential information from the wealth of material available. These persons will probably need to be trained in the specialty areas of science as well as a specialized process of extraction and reorganization of data.
- o requirement of knowledge of sufficient subject matter expertise to analyze and synthesize research findings.

#80 Continued

Other

- I don't believe this will be an objective. Instead, there will be an organization of referees reviewing research papers, establishing the progress accomplished by the investigations, and assessing the credibility of the reported findings. With these comments, the summary will be added to the central information bank, linked to related areas and available to clinical medicine. "Repackaging" is still a memory-oriented thinking - someone must read the package and recall when needed. Interpreted, retrievable research data storage is the objective.

#81 Coordination of curriculum and instructional material development so that locally produced material can be used at other health science institutions.

Medical Librarians

- o advise faculty regarding how to use and availability of materials.
- o advise faculty on the construction of media.
- o production of catalogs and listings of available materials.
- o librarians may provide the inter-institutional mechanism of exchange. Will require the cooperative setting of standards, defining needs, and designing and implementing procedures.
- o liaison with video publishers and film distributors, etc.
- o catalog, store and disseminate information about locally produced material.
- o common cataloging standards to be developed and observed for instructional materials.
- o provide creative interface between conventional library and instructional media systems.
- o AV librarian will have to be familiar with copyright laws, royalty agreements, merchandising contracts, etc.
- o may increase inter-library loans, if library has the responsibility for storage and utilization of media materials.
- o awareness of curricula in schools of allied health science.
- o familiarization with techniques for the evaluation of curricula.

Communication Specialists

- o develop and use communications systems capable of distributing educational material.

Instructional Specialists

- o role will merge with that for librarians, or the librarian will become a paraprofessional.
- o as in previous categories, these persons would be required to help develop common core curriculum and to organize content in such a way that it can be used on an intra-institutional basis.
- o "Instructional Material Evaluators," in our experience, are absolutely essential because materials that are used intra-campus must be validated in a peer review setting. Persons trained in evaluation are essential in this program, since without their specialized training, evaluation amounts to little more than opinion gathering.

Systems Analyst/Programmers

- o development of more comprehensive file formats; closer cooperation with instructional technologists and content experts.

Media Specialists

- o collaboration with systems analysts.

#81 Continued

Academic Faculty

- o this will be an all-important objective for medical schools. As the field of biomedical sciences expands, horizontal knowledge is less and less feasible. Vertical extension of knowledge created super-specialists. While there are hundreds of immunologists, few immunologists work on the source problem. Soon there will be 2-3 experts in each narrow area. Coordination of teaching calls for integration of all super-experts, via a teaching network. Super-experts will contribute by maintaining their own specialty area within the information network.

Other

- o regional coordinators and evaluators to identify material which is relevant to more than one institution.

#82 Establishment of a nationally known "stable" of authors in medical information who will be responsible for producing high quality texts, reviews, etc. in their specialty area.

Medical Librarians

- o librarians, and other information specialists may have a new role in guiding and assisting these authors -- to assure the maintenance of high standards in format and coordination of content.
- o support of authors in making easily and quickly available all or portions of relevant documents.
- o literature search in support of authors.
- o will be required to supply more intensive and direct support to editorial and technical writers.
- o assistance in preparation of research material as background for the authors.

Other

- o persons in this category will most probably come from the medical specialities themselves, after the fashion now used by the publishing industry in the authoring of medical books. Thus, the basic problem here is in compensation of the authors for their efforts, either by money or academic credit.
- o this direction is apparent, although I believe text producing experts will deposit their products in a data bank, accessible to all users, rather than publish and expect that clinicians will read their books. Learning to memorize and then to recall is already obsolete science. Recall from memory should be replaced by recall from a data bank when pertinent. Construction of a good summary of a field which can be deposited in a data bank is a more difficult task than writing it up in book form.

#83 Establishment of regional or even national cooperative groups to prepare "pools" of questions which can be used with self-instructional and self-examination programs.

Medical Librarians

- o librarians will participate in the committee work, to gain familiarity with the content output, so they can serve as coordinators of the cataloging and dissemination of these "pools."
- o the effect on librarians will be to have local librarians provide counselling and serve an information transfer function (through self-instructional materials) - with librarians helping select materials and showing students how to use video and computer materials. National and regional examining groups could be established.
- o assist in the organization of the cooperative group - assist faculty and students in contributing to and use of the question pools.
- o development of protocols for determining and describing questions that medical students appear to have need to answer.
- o creation of library role which counsels student in identification of educational need and helps him to define an educational prescription.
- o familiarization with curricula.
- o knowledge of evaluation techniques in medical education.

Communication Specialists

- o development and instruction in use of communications-computer system capable of handling question pools.

Information Scientist

- o design of experimental situations in which questions are observed, tested and formalized.

Media Specialist

- o much more intensive and extensive collaboration with medical educators.

Academic Faculty

- o will be done by faculty.

Other

- o may not be "cooperative" in narrow sense. ETS may take over this function.
- o while this is probably not realistic, it conceivably could be a part of a broader base program in the preparation of self-instructional packages used regionally or nationally.
- o computer-assisted instruction is an undeveloped field. Every effort should be made to develop this field.

#84 Publishers will support the development of computer-assisted education courses, as they now support the development of textbooks.

Medical Librarians

- o advise users of available courses and how to access systems.
- o librarians will not be involved in the process itself - anymore than they are so in textbook production - they will be affected by the implications: CAI will gain the economic and academic stature of textbooks, commanding the attention of those librarians who have been indifferent.
- o librarians will need to manage "libraries" of materials in machine-readable form
- o copyright: new standards to be developed and observed. New means for charging users and royalty payment/collection to be developed.
- o servicing and assisting in counselling regarding CAI requires familiarity with CAI systems and computer interfaces because many such terminals will be in the library.
- o counsel students regarding identification of their educational needs and what CAI programs to study to meet the needs.
- o provide instruction in use of computer assisted instruction.
- o would be involved in the establishment of selection criteria and the evaluation of new materials.

Instructional Specialists

- o "CAI Director": will simplify his job of trying to get faculty involved in CAI since it will provide new incentives.

Information Scientists

- o development and use of more sophisticated CAI systems - because of publisher support, will have to include mechanisms for collecting royalties, etc.
- o development of CAI programs in collaboration with medical educators.

Media Specialist

- o would be required to collaborate in the development of selection criteria and in the evaluation of new materials.

Other

- o presuming this refers to medical education courses, it does not at this time appear realistic.
- o the publishing industry may focus on potential authors to deposit knowledge, formulate algorithms. There will be a new field of algorithm-based decisions. Instead of printing, small numbers of copies will be necessary to document the algorithms.

#85 The journal will be replaced by a system of distribution of separates -- individual journal-like articles.

Medical Librarians

- o will need to identify and acquire elusive materials. Difficulties will be encountered in cataloging such materials. Problems will be encountered in managing circulation.
- o minor modification in storage process; possible major modification in distribution process. May increase need for abstracting and microform duplication services. May see the development of review services to help users determine which separates to read in full or acquire.
- o computer-based catalogs will be needed locally to manage access. Present card system doesn't include articles from each issue of a periodical. Some general journal reference service in machine readable format, e.g., science citation index, may be adapted to include local holding information.
- o obtaining, indexing and cataloging separates.
- o development of highly dynamic system to control organization and dissemination of "separates" in contrast to conventional serials system.
- o increase the difficulty of producing and checking bibliographies, etc.
- o increased cataloging and indexing activities.
- o the difficulty in tracking down specific items will increase.
- o charge-out rules will change. Some provision for charge-out of pamphlet-like materials will need to be instituted.

Other

- o I do not believe this will occur. Instead, extracted information on specific topics will be needed.

#86 The journal will be replaced by microfiche editions.

Medical Librarians

- o reproduce new materials; file/catalog materials; advise user on access of materials.
- o implement scheme for cataloging and storing microfiche - maintain and instruct users in the operation of microfiche projection and hardcopy reproducers.
- o rapid access to microform formats - maintenance of equipment.
- o librarians, unless they find a way to resist this, will become baby sitters for the microfiche readers and other communications hardware which changes constantly and often breaks down.
- o rules of selection will include form as well as content.

Information Scientists

- o design of rapid access microfiche systems, including communication links to laboratories, offices, etc., and provision of hard copy output at a distance.

Other

- o the journal will be microfile editions.
- o not clear at this time -- presumably new technology will exist to store, search and transmit micro-information.
- o this does not at the present time appear to be realistic. Various forms of electronic data recording need to be further explored.
- o event occurrence assumes that better readers will be marketed.

#87 Research scientists will depend primarily on "selective dissemination of information" (SDI) systems for keeping up with the literature in their field(s).

Medical Librarians

- o will need to know how to draw up profile and how to access data sources such as MEDLINE.
- o will have to arrange for document delivery for those items judged relevant.
- o librarians will be "profile counselors" to help get SDI profiles described most accurately to meet information needs.
- o increased responsibility for more in-depth indexing and referencing of materials.
- o more training in life sciences for librarians.
- o some form of pre-sorting of incoming materials along the lines of user profile patterns will have to be put into effect.
- o will have to develop a catalog of "interest profiles" for medical information users.

Information Scientists

- o increased responsibility for more in-depth indexing and referencing of materials.

Other

- o will likely be handled by publishers and specialized organizations, not libraries.
- o large-scale computer operations will be required to support these services - but it is unlikely that they will be based in the libraries.
- o this will greatly increase the productivity of research. However, instead of citations, schematic summary abstracts will be necessary.
- o SDI systems cost money, if libraries get into this racket, they may be able to derive income; but, most university-based faculty cannot afford SDI.

#88 The "reward systems" in schools of health science will change to give more recognition to faculty who develop effective education media in support of curriculum.

Medical Librarian

- o will require change in faculty codes, procedures, etc., but not in libraries.
- o an effective reward system would be to facilitate video and computer publishing through royalty arrangement. (Same incentive for text book writing.) Libraries will relate to video publishing industry similarly to print publishing.
- o assist faculty and students in the effective development and use of instructional media. Coordinate the distribution of media material.
- o much more direct support of the medical educator; more conferences; formal and informal transactions with this group of users.

Media Specialists

- o develop more effective and sophisticated instructional media. assist faculty and students in use of instructional media based on communications-information technology.

Academic Faculty

- o will require change in faculty codes, procedures, etc., but not in libraries.
- o contribution to education via electronic technology (instead of publishing) must be accepted as equivalent to textbook writing or classroom teaching.
- o great idea, but how do you bring it about!!
- o will lead to reduction in redundant and trivial "pseudo-research" which is now supposed to fulfill demands of reward system. This will reduce some of the present demands on libraries for services connected with development of "pro-forma" literature reviews.

#89 Most medical school curriculums will be shortened to three years, or, entrance criteria will be lowered to something less than a four-year college degree.

Medical Librarians

- o no significant affect on libraries, other than in terms of their increased participation in the redesigned instructional process, covered under other events.
- o this event will probably lead to a greater demand on library resources, especially multi-media instructional packages - hence, the demands on the personnel to provide these materials will be increased.
- o better and faster delivery systems. O.R. studies to determine high-use information so that education can be better serviced.
- o more stress on library and communication staffs without the graduates being any better trained (eventually that produces stress on the patient).
- o workload would increase; much content will have to be transferred from print format to audio-visual formats.

Physicians/Health Care Providers

- o a gamet of health care providers will evolve, from paramedic to super-specialists. Training will vary from six months (supervised paramedic) to 15 years (super-specialists). Coordination and interpretation will be crucial to eliminate competition and to assure that each problem is handled by the lowest level with acequate competence. Computers will play a major role in this by coordination and quality monitoring.

Medical Informationists

- o the shortening of the medical school curricula to three years or even less, will require more intensive efforts by those responsible for information and all of the factors eluded to in these various criteria must be brought to a peak performance. Of a special concern will be the elimination of unnecessary information from the students' program, concentrating on current hard data instead.

Other

- o don't believe this will happen. No change.

#90 A change in the present (American) attitude towards health and medicine such that there will be a drastically lower requirement for, and interest in, access to medical information.

Medical Librarians

- o no significant affect, since medical libraries now contribute so little to the public information process.
- o false; requirement will increase because (a) health maintenance organizations will have incentives to keep people healthy: (b) public access (now almost non-existent) will need to be developed and served.
- o decreased need for maintaining and improving the facilities at a library? -- doubtful event.
- o require better understanding of sociology of medicine in order to predict information needs in a reduced market.
- o to the contrary, I believe the American public will become increasingly interested in their own health self-care and access to medical information.. As a result, it would seem imperative to have an increase in the number of trained persons available to prepare such data.
- o if it would happen, it would put many librarians out of work, but it does not seem very likely.
- o a general downgrading of status (don't believe this event will happen).

#91 Breakdown of state boundaries for education with regional centers of learning developed. Little duplication of departments, faculties, etc., within education regions.

Medical Librarians

- o disseminate information on a wider basis - catalog and retrieve data for distribution.
- o same reduction of duplication and enhanced collaboration would apply to this development as to #61; would require specialization of librarians' functions in support of the specialized tasks at each center.
- o local coordination of access to regional facilities.
- o dissemination of information and communications between centers.
- o corresponding specialization of libraries would seem to follow (with respect to collections, learning materials, etc.).
- o development of highly dynamic cooperative arrangements at all levels of information. Would need an understanding of levels of information, and, sophistication in education, research and public information needs.
- o increased inter-library loan activities.

Communication Specialists

- o develop and use communication systems necessary for communications within a region.

Other

- o I do not believe this is likely to occur.

#93 Since English will be the primary international language in science, US-trained researchers will no longer be required to learn one or more foreign languages.

Medical Librarians

- o this is already true; don't see any particular impact on librarians. All foreign literature will have to be provided in translated form, but that won't affect librarians in any new or different way.
- o this seems to be a valid concept but I cannot identify its impact on biomedical librarians. During the course of visiting medical libraries in Brazil, Chile, Mexico, Cuba and seven Far Eastern countries within the last year, I have observed at least a 75% component of English language works. Therefore, there does seem to be an identifiable trend towards the use of the English language in this regard. In addition, and during these travels, very seldom has it been necessary for me to resort to an interpretor. English is almost universally spoken by students in medicine in all of the countries indicated, including such unexpected places as the School of Oriental Medicine, Kyung Hee University, Korea.
- o less need to carry foreign language journals.
- o shift in selection criteria regarding non-English material - they wouldn't be selected.

Other

- o no change. Do not believe this will happen.
- o no! What about Russian and Chinese?
- o I hope this event does not come to pass.

#94 Training programs and/or internship programs will be developed to train medical librarians to be library administrators.

Medical Librarians

- o job duties won't change...but hopefully there will be more competent people available to fill the advisory jobs which already exist.
- o tasks of medical librarian will become more specific, e.g., administrator, researcher, educational specialist.
- o higher managerial skills; information system development; instructional systems development.
- o increased emphasis on management of communication systems, and on functioning as a researcher in communication systems.
- o familiarization with health care administration methods.

Managers/Directors

- o more sophisticated use of operations research techniques and modern management methods, resulting in the more optimal allocation of scarce resources.
- o people in administrative positions will be put on their mettle because of stronger competition "from below."

Academic Faculty

- o training should be absorbed by the primary basic sciences such as information and communication sciences, decision sciences, medicine, biomedical research. Curriculum should be integrated with internship.

Other

- o basic philosophy of present crop of librarians will have to change before this occurs.

#95 Yet to be known factors will ameliorate the increasing financial crisis caused by the high cost of journal and index-abstracting tools.

Medical Librarians

- o no significant change, but if budget remains the same will allow better personal information service.
- o more range in choice in acquisitions, due to release of funds.

Other

- o hopefully, modern technology will furnish answers to the informatica crisis. Clearly, however, persons must be trained in these new concepts before this can become a reality. It is, therefore, my conclusion that a major national effort should be made towards changing the attitude of the health sciences community towards its need for the type of information most useful. We must be increasingly content with the idea of accepting someone else's analysis of information into a format, individually accessible at the point of need, with methodology available for the immediate and constant update of the information.
- o research is much more expensive (than are journal and index-abstracting tools). A substantial part of coding a report could be done by the author, if machine pre-coding of simple statements would be offered (we have such a system evolving). The evaluation of pre-coded material should be the task of a nationally recognized "referee" network. (Similar to Editors of Journals.) Referees would be responsible for quality and credibility of the author-prepared summary.
- o Good luck!!